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QUEENSLAND AGRICULTURAL JOURNAL

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Event and Comment.

Organised Agriculture.

THE basis of any activity is intelligence. A survey of every problem and need is the first step in agricultural organisation. Formulation of a course of procedure based upon facts, experience, and sound reason follows. With these fundamentals recognised and given a place, initiative and freedom of action in the interests of those to be served are certain to yield results. The Department of Agriculture and Stock and our educational institutions, such as the Queensland University and the Queensland Agricultural High School and College, can and do render highly valuable assistance to the agricultural industry. They are very necessary agencies in the attainment of the objective of organised agriculture in Queensland. They are, moreover, the creation of all the people representing the common interests of all the people. To make our intelligence available, to free it from prejudice and petty and selfish considerations, and give it the impetus necessary for its practical application is one of the most important services we could render to the farming industry in any considered policy for its benefit. Forms and types of service will necessarily vary, but armed with intelligence based on careful survey and analyses and a well-planned programme, organised agriculture will no longer remain a voice crying in the night, with no other language than a cry. Loyal, well-informed leaders whose dominating ambition is to serve their fellow farmers are needed in all our organisations. Then must come co-ordination of farmers' groups whose interests may diverge to some extent, or otherwise become isolated. Those seeking to serve organised agriculture in a big and practical way have in the co-ordination of activities a very high service and a most important job.

Higher Agricultural Education.

THE whole available forces of modern science and invention are also being brought into focus by the Department of Agriculture and Stock on field work and farming problems. Agricultural science has more than vindicated itself as directed by the Department in the results of experimental and demonstration work. All this work is continually producing valuable data for the practical farmer. Under its stimulation soil technicians are enabled to suggest improvement in cultivation methods and innovations in cropping systems; plant breeders are busy in plant study with the purpose of improving yield and disease and drought resistance; while pathologists and entomologists are working hard continuously on the eradication of diseases and pests.

In the Queensland Agricultural High School and College at Gatton we have also an institution that offers to farmers, sons of farmers, and those other young Queenslanders who look to the land for a useful career, specialised instruction of the highest standard and comparable with similar institutions established in the other States of the Commonwealth. The college is strongly and efficiently staffed, and the principal branches of practical agriculture are covered by a modern curriculum. It is believed that the function of higher agricultural education is not only to train students who will ultimately farm their own holdings, but also instructors, research workers, and the moulders of our agricultural future. With this object in view the courses at Gatton should develop still further the scientific side of agriculture, for the college has definitely taken its place as an auxiliary to the Queensland University.

Economic Research.

QUEENSLAND with its vast area, its wide range of soils and climates, and its very small population, must for many years to come remain mainly a primary producing State. That being so, a sound agricultural developmental policy is absolutely essential if we are to secure economic stability. To that end, Departmental policy is being shaped—a policy advancing from stage to stage as the peculiar needs of any or every section of such a complex industry as agriculture become apparent. One of the most clamant needs of the day is scientific and economic research as applied to rural industry generally. The Commonwealth Statistician estimates the public and private wealth of Australia as approximately £3,000,000,000 sterling. The accumulation of such wealth by comparatively a handful of people in so brief a period of time constitutes an unparalleled achievement in the world's history. Most of this wealth has been derived from rural production; nor could it be otherwise in a vast virgin continent that was lying economically idle when first occupied by white people a little more than a century ago. The extent of the contribution of rural industries to the national wealth may be measured by the present yearly rate of rural production, which is approximately £280,000,000 sterling, or about £47 per head of population, or about £125 per head of rural population. The rural population represents 37 per cent. of the population of the Commonwealth, yet on recent figures it is responsible for about 61 per cent. of our total wealth production. Our city population represents 62 per cent. of the total population, but according to the same figures (Commonwealth Year Book) it is responsible for only 31 per cent. of our total production. Mining, forestry, and fisheries make up the balance. (Note.—These percentages are subject to modification, for it is recognised that manufactures, especially in Victoria and New South Wales, have increased remarkably both in output and value in the last couple of years, for which precise figures are unavailable.) The city population, of course, serves the community in other ways as well as in the production of manufactured goods; nor must the fact be lost sight of that the cities as industrial centres, constitute the farmers' best market—the home market. From the foregoing it may be deduced that of the two sections of the Australian population the rural is the richer, but is it? Exactly the opposite is the case. Therefore the need of effective and continuous research at once becomes evident if we are to find the depreciating factors or discover means by which we may improve our methods and the general economy of agriculture.

It should be one of the chief functions of any research bureau to lay bare the governing facts and factors in regard to the present position of agriculture in this State; to determine, for instance, the extent to which the primary producer can command a fair share of the wealth he produces, or the extent to which production costs and artificial economic conditions cut into his legitimate profits. In Australia we stand irrevocably for the maintenance of a living wage, and as a moral principle no one will dispute its justice. But to what extent does that principle hold good for the farmer, who not only puts into his business thought, time, and energy, but also much capital, generally every shilling he possesses? When we talk of the market realisation of primary commodities not covering costs of production, we say, in effect, that had the producer of those commodities no other sources of livelihood or other resources on which he could draw, he would actually starve. How many farmers, it is fair to ask, collect less than the basic wage? That is what economic research must tell us, and how to remedy the well-known anomalies that exist on the economic side of agriculture.

The Work of a Research Bureau.

SPEAKING on the importance of agricultural research at the opening of the Rockhampton Show last month, the Home Secretary (Mr. J. C. Peterson) surveyed the probable work of such a bureau, and the points he made may be summarised thusly:—

(1) To throw a spotlight on the Commonwealth Customs Tariff, examine it closely and suggest remedial measures, if advisable, for new and struggling rural industries.

(2) World's prices are, of course, beyond our control, but costs of production may not be. That is what we have got to find out.

(3) Like those engaged in other businesses, the farmer takes his produce to market, but, unlike them, he cannot balance costs of production by fixing his own prices, and must take what other business men offer him for his produce. He deals, too, in perishable and bulky goods. In the former case he must realise immediately or lose the lot; in the latter, he must pay for storage and costly handling. Then, again, the farmer is not usually a financier, and cannot afford to hold his produce for long. Economic research would show him the lowest price he could afford to accept for his produce; it would also help him by keeping him or his organisations well informed of market movements, of crop estimates, local and general, and in other similar ways.

(4) How often are costs of production in excess of the value of the produce raised and marketed? Is the farmer, who is not allowed to sweat his paid labour, often compelled to sweat his own family? Economic research would supply the answers and suggest the remedy.

(5) In secondary industry rising costs and every other conceivable charge are passed on. The farmer remains the economic shock absorber for the whole community. How we can lessen that economic shock is what we have got to find out.

(6) Ill-digestion of conflicting facts and half truths, when dealing with a sudden crisis in primary industry, is often followed by a temporary palliative which is often unfair to those immediately concerned as well as to the general taxpayer. Economic research, completely impartial and judicial in its outlook, would give timely warning of approaching or threatened crises and suggest means of preventing or avoiding them.

(7) Success of a crop or a section of primary industry in one district does not necessarily imply an equal success in other districts. Economic research would call attention to weaknesses of industries carried on in an unsuitable environment, and add strength to those more satisfactorily circumstanced, with the result that much wasted effort would be avoided and misdirected energy would, in the long run, give way to an all-round improved efficiency.

(8) Agriculture may be an art, but it is also a business in respect to which technical research cannot be separated from economic research.

(9) Many of our farms are over-capitalised, particularly in respect to modern machinery and plant which are often not fully and profitably employed. Economic research would keep the farmer informed on this phase of the industry.

(10) What are the prospects of success before the industrious farmer in regard to actual farming, and apart from a rise in land values or profits from speculative stock dealing? Economic research would give us some idea of the profits from actual production.

(11) To what extent can we absorb new settlers, migrants as well as native born, on our agricultural lands without disturbance of economic conditions, market, and otherwise? Continuous economic research would provide means of careful and accurate computation on this score.

How economic research should be conducted is, of course, a matter of determination by economists. The activities of a research bureau would extend to every section of primary industry, and it would materially add to the wealth of the State by indicating how methods and practices could be improved, how economic crises could be avoided, and how markets could be extended and stabilised.

Bureau of Sugar Experiment Stations.

The Bureau of Sugar Experiment Stations has received the following report (2nd May, 1929) from the Pathological Division of the Bureau:—

DOWNY MILDEW OR "LEAF STRIPE" DISEASE OF SUGARCANE.

Downy mildew or leaf stripe disease of sugar-cane is to be found in most parts of North Queensland wherever susceptible varieties are grown. The country in which the disease originated is not known with certainty, but it has been present in Queensland and Fiji for many years, and in the early days was called "Jump Up" by the kanakas. In 1909 it was found in Formosa, Japan, where it rapidly spread and caused a great deal of damage; and in 1920 it was introduced into the Philippines from Formosa, but prompt measures were taken and the disease was quickly eradicated. It is particularly destructive to the variety B. 208 in the Lower Burdekin, and B. 147 and Pompey in the Mossman district. In the Burdekin the disease has been responsible for the gradual disappearance of B. 208, but we think that with care this fine variety can be brought back again; certainly every effort should be made to accomplish this. The effects of the disease are a marked stunting of the cane and a low sugar content. On the Herbert River in 1910 diseased crops gave a p.o.c.s. of 10.7, as against the mill average of 13.8 for the same period.

Appearance of the Disease.

The first sign of the disease in the young plant or ratoon crop is the appearance of yellowish-white stripes running lengthwise along the newly opened leaves. As the young leaf becomes older the stripes become yellow, then a mottled reddish-brown, and in the older leaves may be a uniform dark-red colour. The stripes are straight and regular and generally run the whole length of the leaf; they run parallel to the large veins of the leaf and remain the same width throughout the whole length. Typical stripes are about one-eighth of an inch wide and alternate with stripes of normal green leaf of about the same width. In many cases, however, the stripes are wider, and in some cases they run together, so that the whole leaf becomes yellow, and later a rusty red.

On the under surface of these yellowish stripes may be found a white, fluffy, "downy mildew." This is most abundant on the younger leaves and is best seen in the early morning, as it may be dried up by the hot midday sun. If a young diseased leaf is sprinkled with water and placed in a closed tin overnight a strong growth of the downy mildew will be found next morning. The leaf should not be kept more than one night, as after that time all sorts of unimportant molds begin to grow.

This stage of the disease may be found all through the year, but is most common in the warm, wet summer months.

In the winter months, especially in old ratoons and abandoned fields, a number of the diseased canes develop into freaks and grow abnormally long and thin. Some of these may be as much as two and a-half times the height of the surrounding cane, and they stand out like flags to indicate the presence of the disease. It was the presence of these very long canes which led the kanakas to apply the name of "Jump Up" to the disease. The leaves on these long canes are short and few in number, and later become shredded and twisted. The sticks are brittle and watery and low in sugar content. This stage is found only in old cane.

The Cause of the Disease.

The disease is caused by a fungus known scientifically as *Sclerospora sacchari* T. Miy., which belongs to the class of fungi called the downy mildews. This fungus grows mainly inside the leaves and the yellowish stripes are formed as a result of its attack on the cells of the leaf. At night the fungus sends little stalks out through the breathing spores of the leaf, and on the ends of these are borne the spores or "seeds" of the fungus. A fresh crop of spores is produced every night and sometimes two or three crops. The spores are very delicate and tiny, being only about one-thousandth of an inch long, and dry up and die as soon as they are exposed to the sun. They are produced in extraordinarily large numbers and form the white downy mildew which is seen on the under surface of the leaves. A scientist, working with a very similar downy mildew disease of maize, estimated that on one diseased maize plant there were produced up to 4,000,000,000 spores in a single night. Since these spores are produced night after night, month after month, it will be understood that one diseased plant could provide enough spores to infect all the cane in the State.

How the Disease is Spread.

As the spores of the fungus are so small and light, they are easily carried from diseased to healthy cane by the lightest of winds and air currents. The spores will only germinate in the presence of moisture, and so the disease spreads mainly during the wet season, when the cane is almost continuously wet. When a freshly-produced spore falls on to a moist surface it will germinate immediately, and if it happens to be lying on a suitable part of a cane plant it will penetrate the tissue, and the plant becomes infected with the disease. The spores may be carried great distances, but they quickly lose their power to germinate, and our experience is that they do not usually infect plants which are more than ten chains away from the diseased stool on which they were produced. (The Bureau is now carrying out experiments to determine exactly the distance over which infection takes place.) It has been found that the plant becomes infected mainly through the tender eyes. The younger eyes towards the top of the stalk are more susceptible than the older eyes toward the butt.

An experiment may be performed by taking some top cuttings of B. 208, or other susceptible varieties, stripping off the trash so as to expose the eyes, and laying them overnight beneath the leaves of a diseased stool. The sets are then planted, and it will be found that a large proportion will give rise to diseased plants as a result of the eyes having been infected by the falling spores.

Standing cane may become infected through the eyes, and yet the fungus may not travel up into the leaves, and thus the cane will appear quite healthy, but on being planted the infected eyes will give rise to diseased plants. It is therefore evident that a cane may appear quite healthy and yet have diseased eyes which will give rise to diseased plants. It is for this reason that cane within ten chains of a single diseased plant is not safe for seed.

Methods of Control.

1. The first line of attack in this, as in most other diseases, is to plant healthy seed when planting susceptible varieties such as B. 208, B. 147, B. 156, and Pompey. It must be remembered that no cane within ten chains of even a single diseased stool can be considered healthy.

2. The young plant cane should be inspected frequently and any diseased stools pulled out and destroyed as soon as they are seen. This should be done during the dry winter months, when the spread of the disease is at a minimum—it is too late when rainy weather starts. It is very easy during the early cultivation to pick out the diseased plants and destroy them.

3. Burn trash immediately after cutting a field which contains some diseased cane.

4. Badly diseased cane should not be ratooned, but should be ploughed out immediately after cutting.

5. Do not have any volunteer ratoons or small patches of abandoned cane.

6. Plant resistant varieties if these precautions cannot be strictly observed.

Mr. George Wilson is at present in the Lower Burdekin district, and any farmer who wishes to plant B. 208 should get in touch with him. Mr. Wilson will give information as to the safest sources of seed, and if necessary will explain in detail the symptoms of the disease and its control. Mr. Wilson's address is Box 93, Post Office, Ayr.

DISEASE SURVEY OF THE GIRU DISTRICT.

A sugar-cane disease survey of the Giru district was carried out during the month of April, and revealed a very satisfactory state of affairs. Seventy-one farms were surveyed, and on fifty-nine of these no major diseases were found; downy mildew (leaf stripe) was found on five farms, and mosaic disease on seven farms. In each case the variety affected was B. 208, this variety being rather susceptible to both diseases. B. 208 is grown on some thirty-five farms. In order to protect the interests of the remaining farmers, orders to eradicate diseased plants were issued to the five farmers who had cane affected with downy mildew. The Bureau intends to see that these orders are carried out, and in this way it is hoped to make the district practically free from all major diseases. It must be emphasised that this very desirable freedom from disease can only be maintained if farmers continue to refrain from bringing in cane from other districts. It is by this means that all sugar-cane diseases are spread, and to introduce varieties from other parts of Queensland is taking a very grave risk. Farmers who desire any varieties which are not growing in their own district are requested to communicate with the Bureau of Sugar Experiment Stations for information as to the best source of that variety.

Any Giru farmer desiring information on downy mildew disease is referred to a circular which was recently issued from the Bureau and published in the Press. In this circular the appearance of the disease and the methods of spread and control were fully described, and it was particularly stated that no B. 208 taken from within a radius of ten chains of even a single diseased stool could be considered as safe seed. Any B. 208 block therefore should be carefully inspected for downy mildew before it can be considered as a source of seed.

The attention of farmers is directed to the fact that the small plantings of the variety P.O.J. 2714 have shown a very marked susceptibility to top rot, and therefore any plantings of this variety should be made with great caution in localities where top rot is prevalent.

GUMMING-FREE FARMS IN THE BUNDABERG DISTRICT.

The farms mentioned in the following list have been periodically inspected during the past year, and no trace of gumming disease has been found on any of the inspections:—

B. O. Smith, North Gooburrum (D. 1135).
W. J. Ferris, Ten-mile Road, Bingera (D. 1135, M. 189).
S. Nicolson, Maryborough Road (1900 S.).
F. G. Petterson, Pine Creek (D. 1135, 1900 S.).
O. Petterson, Pine Creek (1900 S.).
W. McGarry, Pine Creek (1900 S., D. 1135).
H. McGarry, Pine Creek (1900 S., D. 1135).
P. J. McGarry, Pine Creek (1900 S.).
E. J. Gaylard, Electra (H.Q. 285, D. 1135, 1900 S.).
H. Marles, Electra (H.Q. 285).
W. Hull, Yandaran (1900 S., D. 1135).
J. A. Knight, Yandaran (H.Q. 285, D. 1135, 1900 S.).
H. Buchback, Yandaran (H.Q. 285, D. 1135, 1900 S.).
J. Schmidt, Yandaran (D. 1135).
P. G. Maisey, Yandaran (H.Q. 285).
Batt and Dickson, Takoko (H.Q. 285, D. 1135, M. 189).
H. Neubecker, Waterloo, via Yandaran (H.Q. 285, D. 1135, 1900 S.).
R. Williamson, senr., Mullet Creek (1900 S.., M. 189).
F. C. Bugden, Mullet Creek (D. 1135).
G. Visona, Mullet Creek (H.Q. 285, D. 1135).
A. Hyland, Mullet Creek (Q. 855, 1900 S.).
H. Bugden, Mullet Creek (D. 1135).
R. Williamson, junr., Watalgan (H.Q. 285, H. 227, M. 189).
E. J. Grills, Watalgan (D. 1135, 1900 S.).
J. Grills, senr., Watalgan (H.Q. 285).
H. Richter, Watalgan (H.Q. 285, 1900 S.).
Bailey Bros., Miara, via Yandaran (H.Q. 285).

These farms are recommended as suitable sources of seed for the spring planting in so far as freedom from gumming disease is concerned. On some of the farms there is a small percentage of Mosaic, and care should be taken to prevent the cutting of stools affected with this disease. Naturally not every field of cane on these farms is suitable for seed purposes, on account of lack of vigour, &c., and purchasers should select their own seed as far as possible. It is, of course, possible that gumming disease may have been introduced into some of these farms since the last inspection, but this is not considered likely.

Some fifteen additional farms were found to be free from gumming disease, but have had to be abandoned for seed purposes on account of Mosaic disease, or the crops being badly grown.

Suggestions for Owners of Farms Free from Gumming Disease.

The owner of a farm which is free from the destructive gumming disease will naturally desire to maintain this condition, and a study of the following points will assist him in this endeavour:—

1. Make yourself thoroughly acquainted with all the symptoms of gumming disease, particularly the early leaf streak symptoms. The field staff of this Bureau, or the officers at the Experiment Stations, will explain these symptoms, if desired.

2. Gumming is a highly infectious disease, caused by bacteria; the gum which oozes out from the cut ends of badly diseased canes consists of countless numbers of these extremely small germs.
3. The oozing of gum is almost the last stage of the disease. Every stick of cane in a field could be infected with gumming, and yet none of the sticks may have reached the oozing stage.
4. Cane must not be planted merely because it looks healthy; the selection of clean seed in a gumming area is very difficult and should be left to experts.
5. If your farm is clean, plant your own seed. If you desire to try out a new variety, write to the Director, Bureau of Sugar Experiment Stations, Brisbane, and find out if there is any guaranteed clean seed to be had. On no account plant cane from outside, no matter how healthy it looks, unless it has been O.K.'ed by the Director.
6. Gumming is spread from plant to plant in the field through the leaves, during wet, windy weather. The bacteria swim out through scratches in a diseased leaf, are brushed on to a healthy leaf, and enter through scratches in the healthy leaf. A single diseased plant will gradually infect the whole field.
7. Gumming may also be spread from plant to plant, and from field to field, by means of infected cane knives. A clot of gum was placed on a cane knife which was then thrown in a corner—six months later some of the bacteria were still alive and able to infect cane.
8. When selling plants, do not allow the purchaser to use his own cane knife, but see that he uses one of yours.
9. Do not allow men, animals, or implements from another farm to go into your cane during wet weather.
10. Do not allow chop chop from another farm to pass along your headlands, so that the leaves of the chop chop brush against your cane.

INSURANCE FOR THE MAN ON THE LAND.

ESSENTIAL PROTECTIVE SERVICE.

The time has fortunately long since passed when it was necessary for the representative of the insurance office to first persuade his prospective client that insurance was sound business and not a form of gambling. There may be a few remaining still holding this latter erroneous view, but the man on the land of to-day as a rule is keen, businesslike, and fully seized with the necessity for the protection of his assets against loss through one of the many risks incidental to his calling, the happening of any of which might seriously cripple him financially. Insurance spreading among many the losses which otherwise would fall heavily on the few is scientific and prudent, and in affording relief against misfortune achieves the object for which it was brought into being.

The present is a progressively mechanical age, and the advent of the numerous modern machines, which tend to greatly lighten the labour of the primary producer also tend to increase in many ways the risk of fire and accident. The forms of insurance protection available at the present time as a result of this progress are much more numerous than was the case twenty years ago, and the necessity for insurance cover more urgent. While almost every farmer has for years past insured against fire his buildings he may now secure policies which will cover him against many other forms of loss. For example, wool is covered from the sheep's back until sold locally or overseas.

In respect of his legal liability for workers' compensation for accidents to his workmen arising out of or in the course of their employment full protection may be obtained, while for damage to persons or property as the result of the negligent driving of his motor-car, his tractor, or his other vehicles he may secure indemnity, including also the refund of his legal expenses in connection with the defence of any claims made on him in this connection. The insurance office of to-day is an economic necessity, and the prudent man on the land needs no convincing that the cost of his insurance premiums is a necessary working expense which secures for him essential protective service.

FEEDING HABITS OF SOME QUEENSLAND BIRDS.

By HUBERT JARVIS, Entomological Branch.

The value of Queensland native birds and the importance of their protection have long been realised by many agriculturists and by those interested in ornithology. Many other members of the community, however, are less appreciative of the value of bird life, and it frequently becomes necessary to demonstrate to them the grounds on which the protection of birds is based. The decision to protect a species of bird on account of its economic status must be based upon an accurate knowledge of its feeding habits, and a valuable contribution to such knowledge can be obtained by an examination of its stomach contents. As a contribution to such a fund of knowledge, a number of the commoner Queensland birds were shot some years ago, and an examination was made of their stomach contents in the Department of Agriculture and Stock.

This work was initiated by the late Government Entomologist and Vegetable Pathologist (Mr. Henry Tryon), who identified the fifty-eight birds herein dealt with. The stomach contents in each case were determined by the writer during the years 1919 and 1920.

The birds were all collected in the Mount Gravatt area, near Brisbane, by Mr. Thomas Batchelor, whose skill as a taxidermist enabled him to mount for exhibition every bird shot, and the interesting collection thus made was acquired by the Department of Agriculture and Stock as a permanent exhibit.

After their determination the stomach contents were mounted on cards of uniform size, the fragments representing each group of insect, being kept in separate areas. (Plate 1.) In many cases where an insect was found more or less complete it was possible to determine the family to which it belonged; but this was not always the case, as, frequently, the insect remains were broken into small fragments, making the identification of its systematic position impossible.

Each card was labelled with the name of the bird and a general description of the stomach contents, and the cards were arranged in exhibition cases, where they are now permanently on view in the Entomological Museum of the Department of Agriculture and Stock, Brisbane.

The information obtained as a result of these examinations has hitherto been available only to visitors to the Entomological Museum, and it has now been thought desirable to place it on record in the "Agricultural Journal," thus making it available to the agricultural community and to such sections of the scientific world as are interested in ornithological matters.

The nomenclature used in these notes is the one adopted in "The Official Check List of the Birds of Australia," and the numbers in brackets in this article refer to the consecutive numbers of the species in the check list mentioned.

It is now being realised by most orchardists that birds, destructive to the fruit crops during six or eight weeks in summer, may yet be doing useful work during the remainder of the year; and if this is the case even they are, therefore, worth protecting.

Few if any of Queensland's native birds are entirely destructive, and the value of by far the greater number to the agriculturist is now generally conceded.

Although it was found possible to examine comparatively few of the common birds, and in some cases only one of a species was procurable, the information obtained is, nevertheless, interesting, showing as it does how large a part of the dietary of nearly every bird examined was composed of insects.

1. (447) Australian Ground-Thrush (*Oreocincla lunulata* Latham)—Coleoptera, 1 Scarabæid, 1 Carab, 1 specimen undetermined; Hymenoptera, 1 ant; Hemiptera, 1 Asopid, 2 other specimens: Larvæ, 2 dipterous: fragments of vegetable matter.

2. (447) Australian Ground-Thrush (*Oreocincla lunulata* Latham)—Coleoptera, 2 Tenebrionids; Coleopterous larvæ, 3 wireworms; no seeds, fruit, &c.

3. (647) Australian Pipit (Ground Lark) (*Anthus* (*Austranthus*) *australis* Viellot)—Sow bug, cicadas, leaf hoppers; 6 small seeds.

4. (524) Australian Reed-Warbler (*Acrocephalus* (*Conopoderas*) *australis* Gould)—Cicadas, 3 beetles; no seeds, fruit, &c.

5. (179) Australian White Ibis (*Threskiornis mollucca* Cuvier)—Dragon fly larvæ, water bugs; no seeds, fruit, &c.

6. (428) Barred Cuckoo-Shrike (*Coracina* (*Paragraucalus*) *lineata* Swainson)—Beetles, dragon flies; small seeds.

7. (705) Black-backed Magpie (*Gymnorhina tibicen* Latham)—2 crickets, 5 small Phasmids (stick insects), 3 spiders, 4 Coprid bettles, 1 small lizard; no seeds, fruit, &c.

8. (705) Black-backed Magpie (*Gymnorhina tibicen* Latham)—1 cricket, 4 spiders, 1 Ichneumon, 1 Carabid beetle, 5 Coprid beetles, miscellaneous beetle fragments; no seeds, fruit, &c.

9. (705) Black-backed Magpie (*Gymnorhina tibicen* Latham)—Grasshoppers, beetles; lantana seeds.

10. (705) Black-backed Magpie (*Gymnorhina tibicen* Latham)—Grasshopper, cicada, beetle fragments: no seeds, fruit, &c.

11. (373) Black-faced Flycatcher (*Monarcha melanopsis* Vieillot)—Coleoptera, 1 Clerid; Hymenoptera, large quantity of fragments; Diptera, fragments; Homoptera, 1 or more cicadas (small species); no seeds, fruit, &c.

12. (56) Dusky Moorhen (*Gallinula tenebrosa* Gould)—No insects; stones, vegetable matter.

13. (547) Dusky Wood-Swallow (*Artamus* (*Angroyan*) *cyanopterus* Latham)—5 beetles, 30 flies (miscellaneous); no seeds, fruit, &c.

14. (547) Dusky Wood-Swallow (*Artamus* (*Angroyan*) *cyanopterus* Latham)—20 caterpillars; no seeds, fruit, &c.

15. (318) Eastern Broad-billed Roller (Dollar-bird) (*Eurystomus orientalis* Linné)—3 cicadas, several beetles; no seeds, fruit, &c.

16. (318) Eastern Broad-billed Roller (Dollar-bird)—(*Eurystomus orientalis* Linné)—6 large cicadas; no seeds, fruit, &c.

17. (318) Eastern Broad-billed Roller (Dollar-bird) (*Eurystomus orientalis* Linné)—Large number of small beetles; no seeds, fruit, &c.

18. (318) Eastern Broad-billed Roller (Dollar-bird) (*Eurystomus orientalis* Linné)—40 small cicadas, 1 large bee, 12 beetles; no seeds, fruit, &c.

19. (421) Eastern Whipbird (*Psophodes olivaceus* Latham)—Cicadas, large number of fragments, 1 small lizard; no seeds, fruit, &c.

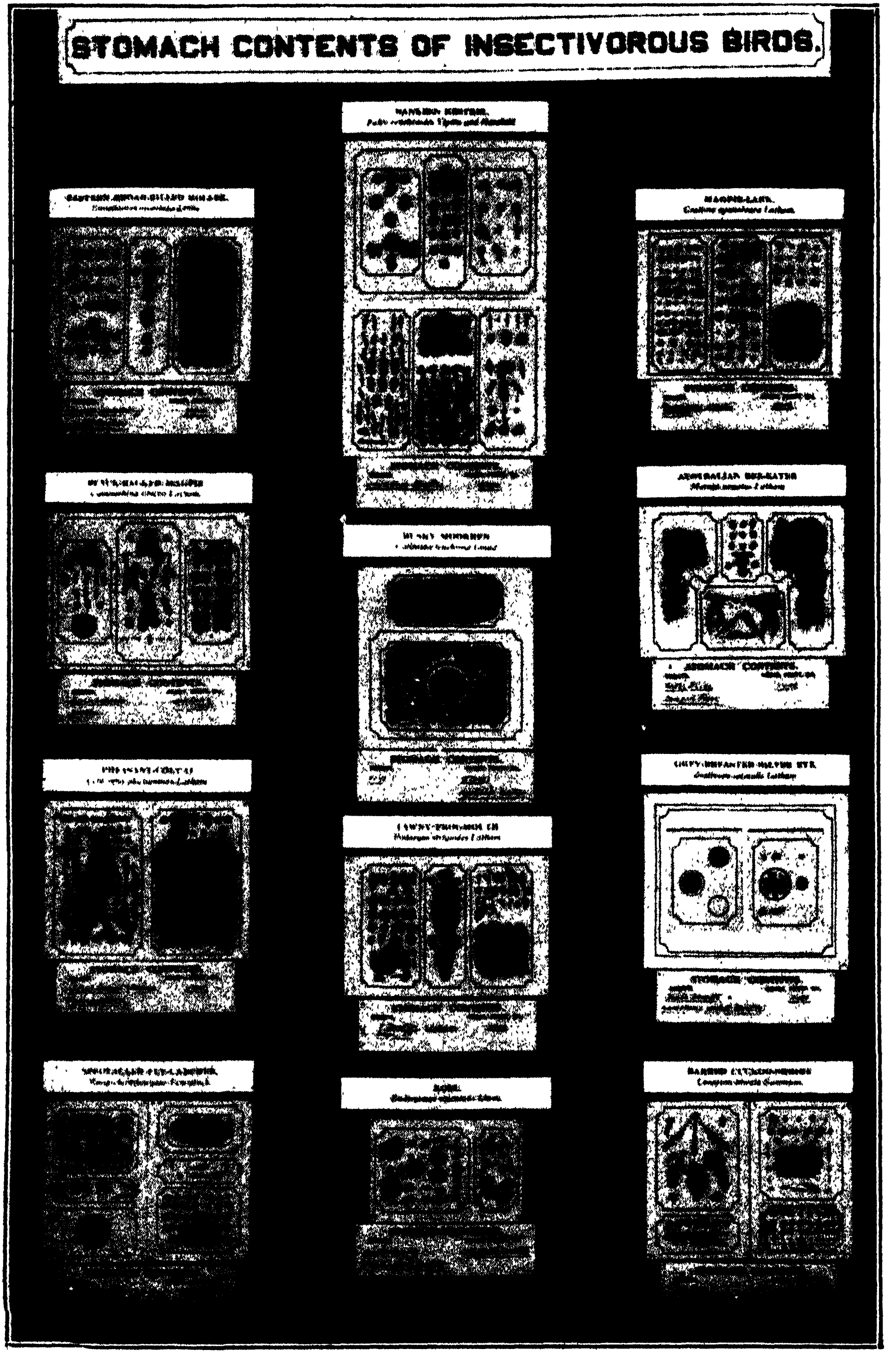


PLATE 1.

20. (324) Forest-Kingfisher (*Halcyon* (*Lazulena*) *macleayi* Jardine and Selby)—Dragon flies, large cockroach, ants; no seeds, fruit, &c.

21. (324) Forest-Kingfisher (*Halcyon* (*Lazulena*) *macleayi* Jardine and Selby)—2 grasshoppers, 1 cicada, 9 beetles; no seeds, fruit, &c.

22. (398) Golden Whistler (*Pachycephala pectoralis* Latham)—Coleoptera, 7 or more small beetles; Hymenoptera, ants, 1 Hymenopteron; Heteroptera, 1 plant bug; Larvæ, 4 or more Lepidopterous; no seeds, fruit, &c.

23. (676) Green Catbird (*Ailuroedus crassirostris* Paykull)—Coleoptera, 9 or more large Coprids; 9 large seeds, 3 small seeds.

24. (574) Grey-breasted Silvereye (*Zosterops lateralis* Latham)—Scale insects, numerous small beetles; no seeds, fruit, &c.

25. (361) Grey Fantail (*Rhipidura flabellifera* Gmelin)—1 grasshopper, 2 large spiders, 1 small lizard; no seeds, fruit, &c.

26. (429) Jardine Caterpillar-Eater (Cicada-bird) (*Endoliisoma* (*Metagraucalus*) *tenuirostre* Jardine)—2 large crickets, 4 small cicadas; no seeds, fruit, &c.

27. (429) Jardine Caterpillar-Eater (Cicada-bird) (*Endoliisoma* (*Metagraucalus*) *tenuirostre* Jardine)—Caterpillars, 26 or more (unidentified); 3 seeds.

28. (347) Koel (Cooee-bird) (*Eudynamys orientalis* Linné)--A number of plant-eating beetles; vegetable matter.

29. (322) Laughing Kookaburra (*Dacelo gigas* Boddaert)—1 cicada, 6 large ants, 2 spiders, 6 beetles (1 Clerid species, 1 Anoplognathus species, 4 plant-eaters Paropsis species); no seeds, fruit, &c.

30. (322) Laughing Kookaburra (*Dacelo gigas* Boddaert)—1 land crab; no seeds, fruit, &c.

31. (322) Laughing Kookaburra (*Dacelo gigas* Boddaert)—1 large grasshopper; no seeds, fruit, &c.

32. (415) Magpie-Lark (*Grallina cyanoleuca* Latham)—39 ants, 8 beetles, leaf hoppers; small seeds.

33. (415) Magpie-Lark (*Grallina cyanoleuca* Latham)—Numerous small beetles; no seeds, fruit, &c.

34. (415) Magpie-Lark (*Grallina cyanoleuca* Latham)—40 small beetles, large number of ants; no seeds, fruit, &c.

35. (240) Nankeen Kestrel (*Falco* (*Cerchneis*) *cenchroides* Vigors and Horsfield)—24 large beetles; no seeds, fruit, &c.

36. (645) Noisy Friar-bird (*Philemon* (*Tropidorhynchus*) *corniculatus* Latham)—Beetles (root-eating); no seeds, fruit, &c.

37. (352) Noisy Pitta (*Pitta* (*Coloburis*) *versicolor* Swainson)—Coleoptera, 8 Coprids, 4 weevils (3 species); no seeds, fruit, &c.

38. (352) Noisy Pitta (*Pitta* (*Coloburis*) *versicolor* Swainson)—Coleoptera, 3 large Scarabæids, 12 or more Coprids; 1 Japyx; no seeds, fruit, &c.

39. (686) Paradise Rifle-bird (*Ptiloris paradiseus* Swainson)—Coleoptera, 1 Chalcopterus species, 1 Tenebrionid, 2 large beetles; Hymenoptera, 36 small ants, 3 large specimens; Larvæ, 1 Coleopterous; fragments of wood; 3 seeds (accidental?).

40. (686) Paradise Rifle-bird (*Ptiloris paradiseus* Swainson)—Coleoptera, 3 Tenebrionids; Orthoptera, 2 crickets, 1 small cockroach;

Hymenoptera, 4 or more ants (undetermined); Spiders, 2 or more: Larvæ, 1 large Cerambycid (wood borer); no seeds, fruit, &c.

41. (686) Paradise Rifle-bird (*Ptiloris paradiseus* (Swainson)—Coleoptera, 3 or more Tenebrionids (Chalcopterus); Lepidoptera, 10 larvæ, 5 pupæ; Hymenoptera, 1 wasp; no seeds, fruit, &c.

42. (349) Pheasant-Coucal (*Centropus* (*Polophilus*) *phasianinus* Latham)—Stick insects (Phasmids), grasshoppers; seeds.

43. (349) Pheasant-Coucal (*Centropus* (*Polophilus*) *phasianinus* Latham)—Very large caterpillar, 4 plant-eating beetles; small seeds.

44. (700) Pied Butcher-bird (*Cracticus nigrogularis* Gould)—Heteroptera, 9 water bugs; fragments; no seeds, fruit, &c.

45. (700) Pied Butcher-bird (*Cracticus nigrogularis* Gould)—5 dragon flies, 2 large grasshoppers; no seeds, fruit, &c.

46. (694) Pied Currawong (Bell-Magpie) (*Strepera graculina* Shaw)—Coleoptera, 2 Coprids (large), 1 Coprid (small); Hymenoptera, 2 ants, 1 Ichneumon; Mollusca, 1 snail; small quantity of vegetable matter.

47. (329) Rainbow-bird or Australian Bee-Eater (*Merops* (*Cosmaerops*) *ornatus* Latham)—Ants, flies, dragon flies; no seeds, fruit, &c.

48. (684) Regent Bower-bird (*Sericulus chrysocephalus* Lewin)—Coleoptera, 1 beetle; Orthoptera, 1 grasshopper; Hymenoptera, 1 ant (head only); Dermaptera, 1 earwig; seeds and fragments of vegetable matter.

49. (679) Satin Bower-bird (*Ptilonorhynchus violaceus* Vieillot)—Coleoptera, 3 plant-eating beetles (*Phyllocharis cyaniformis*); native fruit.

50. (679) Satin Bower-bird (*Ptilonorhynchus violaceus* Vieillot)—No insects; lantana seeds, fruit skins.

51. (392) Southern Yellow Robin (*Eopsaltria australis* Shaw)—Lepidoptera, 1 small pupa; Hemiptera, 1 black bug (Aednus species). 2 small Lygaeids; Hymenoptera, 1 Ichneumon, 3 ants; 1 spider; no seeds, fruit, &c.

52. (673) Spangled Drongo (*Chibia* (*Notochibia*) *bracteata* Gould)—1 bug, 15 wasps, 7 plant-eating beetles; no seeds, fruit, &c.

53. (673) Spangled Drongo (*Chibia* (*Notochibia*) *bracteata* Gould—Coleoptera, bark beetle (Chalcopterus species); Dynastid species; Homoptera, small cicada (Pauropsalta species); no seeds, fruit, &c.

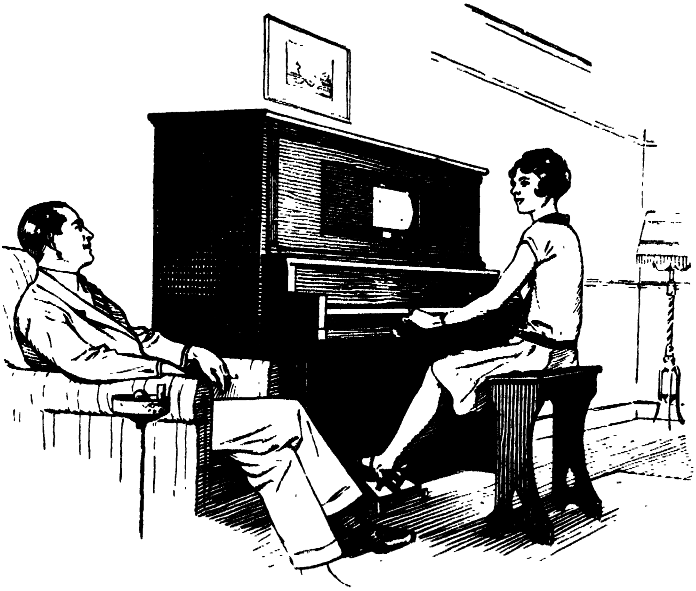
54. (375) Spectacled Fly-Catcher (*Monarcha* (*Symposiachrus*) *trivirgata* Temminck)—Numerous flies and small beetles; no seeds, fruit, &c.

55. (565) Spotted Pardalote (*Pardalotus punctatus* Shaw)—Leaf hoppers, 30 ants; no seeds, fruit, &c.

56. (313) Tawny Frogmouth (*Podargus strigoides* Latham)—7 beetles, cicadas, bugs; no seeds, fruit, &c.

57. (313) Tawny Frogmouth (*Podargus strigoides* Latham)—30 large beetles, 1 mole cricket, 3 large ants; no seeds, fruit, &c.

58. (536) Variegated Wren (*Malurus* (*Leggeornis*) *lamberti* Vigors and Horsfield)—Hymenoptera, 7 or more ants: Hemiptera, 22 plant bugs (Nysius species); 1 spider; no seeds, fruit, &c.



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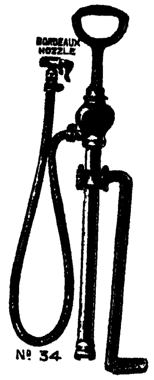

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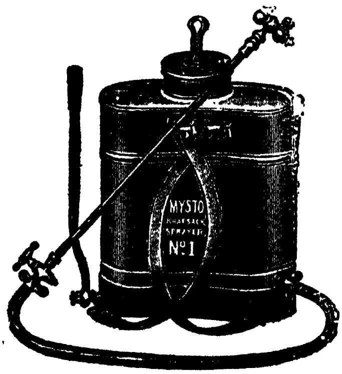

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PESTS OF DECIDUOUS FRUITS.*

By ROBERT VEITCH, B.Sc., F.E.S., Chief Entomologist.

The following insects are dealt with in these notes:—Queensland fruit fly, codling moth, woolly apple aphis, and San José scale.

The Queensland Fruit Fly.

The Queensland fruit fly (*Chætodacus tryoni* Froggatt) is rightly regarded as being worthy of inclusion in the category of highly destructive insects. Records of its occurrence were obtained in the early days of fruit-growing in this State, and for almost forty years it has been a subject of great interest to both fruit-growers and scientific investigators. It has frequently been stated that the Queensland fruit fly is identical with an Indian species, *Dacus ferrugineus* F., but local opinion favours the belief that the fly now under discussion is a native of this country and is not the Indian species referred to. The Queensland fruit fly is not confined to this State, for many records of its occurrence have been obtained in the neighbouring State of New South Wales.

DETAILED INVESTIGATIONS.

The following paragraphs contain a brief account of what is at present known with respect to the life history and control of the Queensland fruit fly. The pest was studied by Henry Tryon many years ago, and more recently it has been the subject of a detailed investigation by Hubert Jarvis, the Departmental Entomologist stationed in the Stanthorpe district. Tryon's early reports have long been out of print, but that is not the case with respect to those prepared by Jarvis, and readers who desire fuller details with respect to this pest should accordingly consult the various progress reports published by Jarvis. The Queensland fruit fly has also been extensively studied by F. A. Perkins, who was located at Stanthorpe for several years as Stanthorpe Research Fellow, working in association with the University of Queensland. A number of progress reports by the latter investigator have appeared in the local press.

NATURE OF INJURY.

The larva or maggot is the life-cycle stage in which this insect damages fruit. The larva feeds voraciously and tunnels throughout the fruit in any direction, and not only does it destroy much tissue in doing so, but its presence also leads to the rotting of the attacked fruit, which is rendered valueless for marketing.

FRUITS ATTACKED.

The fact that the Queensland fruit fly has been a pest of outstanding importance of deciduous fruits grown in the Stanthorpe district has sometimes somewhat obscured the additional fact that it is a species that attacks a wide range of cultivated fruits other than those produced at Stanthorpe.

It has been recorded as attacking the following fruits:—Apple, apricot, banana, cape gooseberry, cherry, custard apple, date, fig, granadilla, grape, grape fruit, loquat, mandarin, mango, nectarine, passion fruit, papaw, orange, peach, pear, persimmon, plum, quince, tomato, and walnut. It has also been bred from quite a number of other fruits, including those of certain native trees.

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*Reprinted from "Pests and Diseases of Queensland Fruits and Vegetables," by Robert Veitch, B.Sc., F.E.S., and J. H. Simmonds, M.Sc., published by the Department of Agriculture and Stock, Brisbane, 1929.

The Queensland fruit fly attacks bananas in the Southern banana districts, but in the North the fruit fly losses in bananas are due to the presence of another species, namely *Chætodacus musæ* Tryon.

It is rather a curious fact that the notorious Mediterranean fruit fly (*Ceratitis capitata* Wied.) does not occur in this State, although it is a very common species in the neighbouring State of New South Wales.

LIFE CYCLE STAGES.

The egg (Plate 2, fig. 1) of the Queensland fruit fly is creamy white in colour and is distinctly elongate. It is slightly curved and tapers at both ends, measuring roughly about $\frac{1}{25}$ inch in length. It might quite appropriately be described as being somewhat banana-shaped.

The larva (Plate 2, fig. 2) is creamy white in colour and measures about ⅓ inch in length when full-grown. It is bluntly rounded off at the anal end but it tapers off to a fine point at the head end. It is legless but is nevertheless capable of moving over a surface when removed from the fruit, and it is, further, capable of jumping quite appreciable distances.

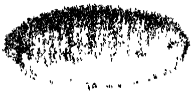
The pupa is formed within a somewhat hard-shelled yellowish-brown or reddish-brown cylinder, known as the puparium (Plate 2, fig. 3). The puparium is bluntly rounded off at either end and is about ⅙ inch in length.

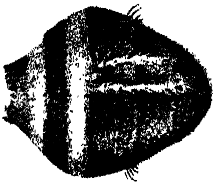
The adult (Plate 2, fig. 4) is a rather prettily marked fly, of a somewhat reddish-brown colour broken by numerous conspicuous lemon-yellow spots or lines on the thoracic segments. In the female there is an ovipositor or egg-laying tube at the apex of the abdomen (Plate 2, fig. 4); in the male the abdomen has a distinct fringe of bristles on each side (Plate 2, fig. 5). The single pair of wings is clear or hyaline, except for certain areas which are quite distinctly coloured as indicated in the accompanying plate. The fly is about ⅓ inch in length with a wing-spread of about ⅔ inch.

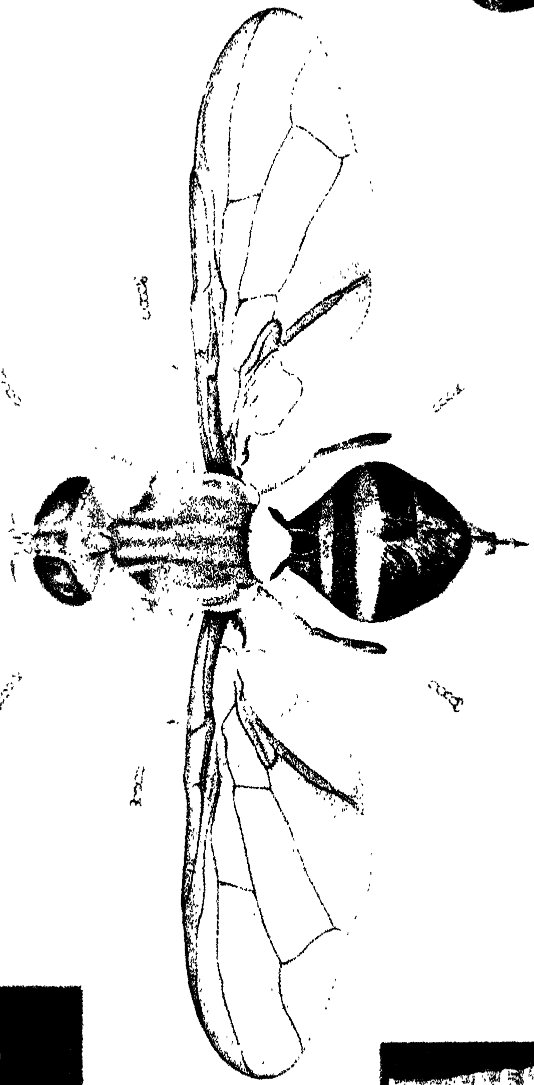
LIFE HISTORY.

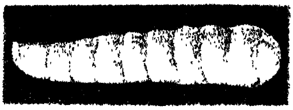
The female fly, when ready for egg-laying, selects a suitable fruit in the skin of which she makes a slight puncture, and then inserts a number of eggs in the underlying tissue. The site chosen for oviposition by the fly can be detected by the presence of the puncture which, in the case of certain fruits, exudes a small quantity of gum. It is generally agreed that six or seven eggs may be laid when each puncture is made, but a more difficult point is to accurately determine the total egg-laying capacity of each individual. That has not been ascertained, but dissections of Stanthorpe flies have disclosed the presence of some fifty or sixty eggs in the ovaries.

The eggs undergo the usual incubation transformation, and the larvæ hatch out in two or three days in the warm summer months. They then feed on the tissue of the fruit, thus producing the damage and losses already described. The maggot grows rapidly in the height of summer, when it is feeding under favourable conditions, and after passing through a series of moults it becomes full-grown in six or seven days. In colder weather, however, this stage of the life cycle is much prolonged.









When the larvæ are full-grown they leave the fruit and burrow into the soil for the purpose of pupating. The pupæ are formed at varying depths, which depend on a variety of factors, including the nature of the soil. They may be found just covered by the soil or they may be located at a depth of several inches, although they are rarely found at a greater depth than 2 inches. As already mentioned, the pupæ are formed within reddish-brown or dark-brown cylindrical puparia. The pupal period may be as short as one week in the height of summer, or it may be very greatly prolonged in the colder months. In fact, the fly has been proved to overwinter in small numbers as pupæ in the Stanthorpe district.

At the end of the pupal period the flies emerge, feed, mate, and lay eggs, and thus the next generation is produced.

NATURAL ENEMIES.

A number of parasites have been bred from the Queensland fruit fly, the best known of which is the Braconid wasp *Opius tryoni* Cameron. In some seasons this parasite is particularly active in attacking the fruit-fly maggots in native fruits, and it has also been bred from fly-infested cultivated fruits.

Certain predatory insects also assist the parasites in maintaining a partial control over this pest. The degree of biological control exercised by these native enemies is, however, only relatively slight, and hence the orchardist must resort to artificial control measures to check the ravages of this pest and to supplement the efforts of the parasitic and predatory enemies.

CONTROL MEASURES.

The preceding brief outline of the life history of the Queensland fruit fly should clearly indicate the possibility of the successful adoption of certain measures of control. Outstandingly important in the campaign against this pest is the collection and destruction of infested fruit. This measure has been consistently advocated ever since the attention of investigators was first directed to the problem some forty years ago, and it should still be retained as an extremely important means of combating the fruit fly.

Orchard hygiene should therefore be the first line of attack against this pest, and infested fruit should be regularly collected and destroyed. To facilitate the picking up of infested fruit that has fallen to the ground, the orchard should be kept as free from weeds as is practicable. If the orchard is overgrown, then efficient picking up will be a matter of considerable difficulty, and much infested fallen fruit will be overlooked, and the maggots contained therein will leave the fruit, pupate in the soil, and produce a fresh brood of flies.

When the infested fruit has been collected, the question of the best means whereby it may be disposed of automatically arises; the orchardist has the choice of several means of dealing with that fruit, and each of these is quite satisfactory, if properly practised.

One at least is, however, open to serious objection if carelessly carried out, and indeed, when proper precautions are not observed, the labour expended on the collection of the fruit is rendered quite valueless. Here reference is made to the burying of the infested fruit.

Boiling infested fruit that has been picked up is a very effective means of disposal, and is one that is in general favour. Burning the stung fruit in a good hot fire can also be practised, and, as already mentioned, the burying of picked-up fruit is an alternative means of disposal. When the latter practice is followed, every precaution must, however, be taken to ensure that the fruit is buried deeply, i.e., with a soil covering of about 18 inches. If the stung fruit is but slightly covered with soil, no good will have been accomplished by its collection, for large numbers of flies can emerge from infested fruit that has been buried in a shallow trench.

The next control measure to which reference must be made is the reduction of the adult fly population by means of luring. A lure and suitable glass traps are now on the market; where these are employed in an orchard they should be placed on boards in leafy trees and then baited with the fruit-fly lure. It is essential that the traps be placed in the orchard early in the season, and that they receive regular attention for such purposes as the renewal of the lure.

A further control measure of value is the elimination of all useless fruit-trees or other plants that may serve to harbour the fly and to act as a source of infestation in which flies will be bred to attack and destroy the cultivated fruits on which the orchardist is making his living.

The possibility of controlling the Queensland fruit fly by the use of both repellents and poison sprays has not infrequently been a subject of inquiry, but, so far as the entomological branch of this department is concerned, it possesses no definite evidence to show that these measures can as yet be recommended as being both practicable and effective. They are, however, worthy of some further attention, but in the meantime efforts at control should be concentrated on the measures already recommended.

Firstly, collect and destroy infested fruit; secondly, trap the adult fly; and thirdly, eliminate worthless, non-commercial fruit-trees.

The Codling Moth.

The codling moth (*Cydia pomonella* Linn.) is without doubt one of the most serious pests of the apple in Queensland, and the losses due to its destructive activities are surpassed only by those inflicted by the Queensland fruit fly. Elsewhere the codling moth is generally regarded as the worst insect pest known to the apple-grower.

It is believed that this pest is a native of South-eastern Europe, whence it has spread to every other continent, and it is safe to say that there are few districts in which apples are grown that are not now thoroughly infested. The Stanthorpe district of Queensland is unfortunately included in the infested areas. It is somewhat difficult to say just when the codling moth reached Queensland, but records show that infested fruit was observed in Brisbane in 1889. Much earlier references to this pest are available in the Southern States, and a severe infestation was recorded in Tasmania as far back as 1857.

The word "codling" is, in the opinion of some investigators, merely a corruption of the old English word "querdlying," a term that was employed to signify a half-grown or immature apple. It has also been employed in more recent years to designate a number of varieties of cooking apples.

The "wormy" apples produced by the feeding of the codling moth larvæ have been referred to in European publications for centuries, and a reference to "wormy apples" occurs even as early as 200 B.C. in Cato's treatise on agriculture.

The codling moth belongs to the family Tortricidæ in the order Lepidoptera, and is very closely allied to several species that also live in fruits and seeds, e.g. the nut fruit tortrix (*Carpocapsa splendidana* Hb.), which attacks the fruits of Spanish chestnuts in Europe.

NATURE OF INJURY.

The injury, as is the case with practically all species of destructive moths, is inflicted in the immature stage known as the larva or caterpillar, the moth itself being quite incapable of attacking the fruit. The larva, on hatching from the egg laid by the moth, enters the fruit and eats its way through the flesh to the core. There it continues feeding, and in doing so it scoops out an irregular cavity and also feeds on the pips. Much of the attacked fruit falls to the ground while still small and green, and is obviously quite unmarketable.

FRUITS ATTACKED.

The apple is pre-eminently the fruit that is severely attacked by the codling moth, although very appreciable losses may also occur in pears, quinces, and walnuts. The peach, nectarine, plum, apricot, and cherry have also been recorded as host fruits of this pest.

LIFE CYCLE STAGES.

The egg (Plate 3, fig. 1) of the codling moth is somewhat oval in outline, and is about the size of a small pin's head. It is a very thin, semi-transparent object, and has been rather aptly described as resembling a fish-scale. When just laid the egg is pearly white in colour, but as the incubation period advances a red ring develops which tends to give it a darker appearance. An examination with a hand lens will show that its surface, particularly round the flange, possesses a beautifully sculptured network of ridges.

The larva (Plate 3, fig. 2), when full-grown, is about ¾ inch in length, and is pinkish or whitish in colour, with a brown head and a number of scattered hairs on the body. It possesses eight pairs of legs, three of these being jointed legs situated on the thoracic segments, while the remaining five pairs are fleshy unjointed legs situated on the abdominal segments.

The pupa or chrysalis (Plate 3, fig. 4) is brown in colour, and measures about ½ inch in length. The head, eyes, antennæ, and legs of the future moth can be distinctly seen in the pupa.

The moth (Plate 3, figs. 5, 6) measures about ¾ inch when its wings are spread out (as in fig. 5 of Plate 3). The front wings are grey in colour, but the uniformity thereof is broken by a number of irregular darker transverse lines, and is further modified by a patch of beautiful copper-coloured scales of a metallic tint. The hind wings are a plain greyish-brown colour.

LIFE HISTORY.

The codling moth passes through the winter months as a larva in a tough silken cocoon (Plate 3, fig. 3), and the stock of codling moth

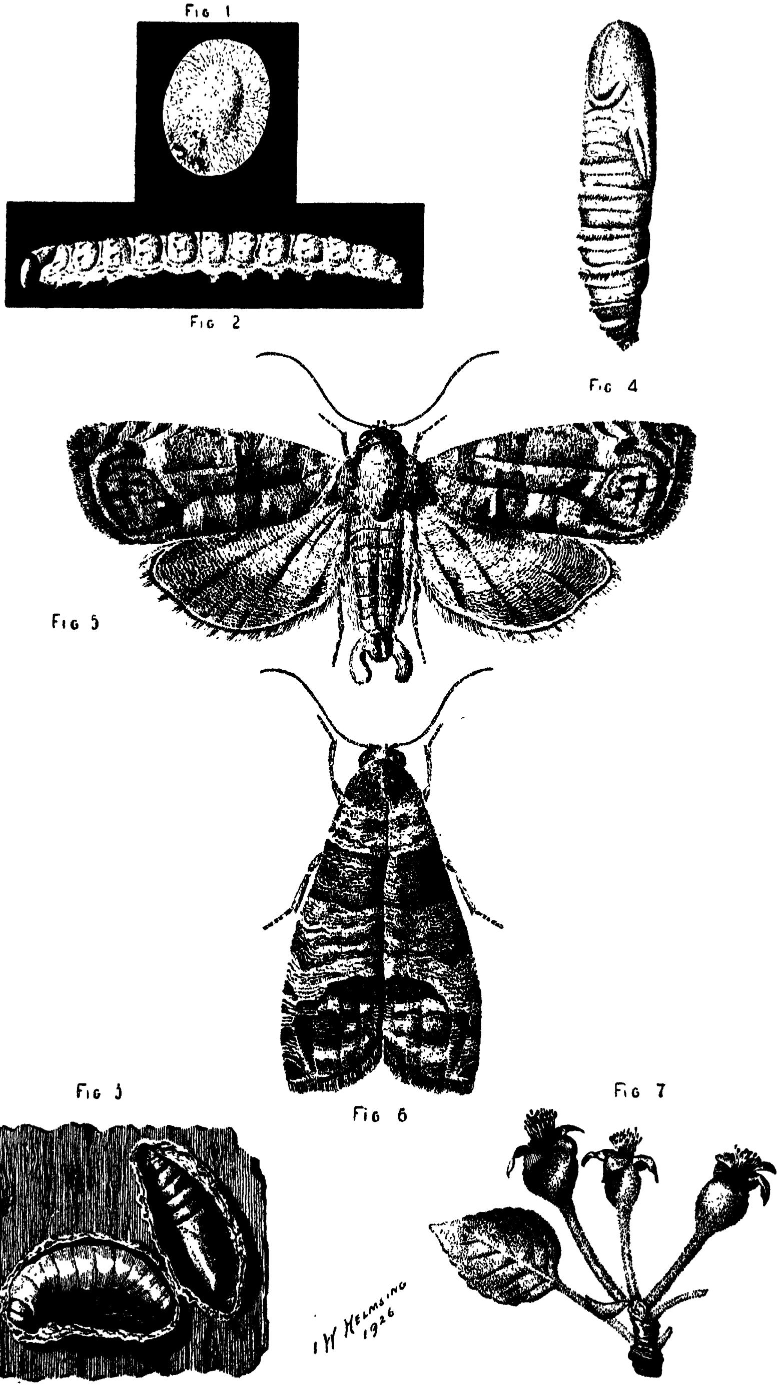


PLATE 3.—THE CODLING MOTH (*Cydia pomonella* Linnæus).

Fig. 1.—Egg of codling moth × 15.
Fig. 2.—Larva × 4.
Fig. 3.—Larva and pupa in silken cocoons × 2.
Fig. 4.—Pupa × 4.
Fig. 5.—Moth or imago with wings spread × 5.
Fig. 6.—Moth or imago with wings folded × 5.
Fig. 7.—Correct time for first spray.

available for starting the infestation each season on the orchard consists of such larvæ as have survived the winter in safe situations.

At the approach of spring these overwintering larvæ transform to pupæ, and in the pupal stage profound reorganisation takes place, as a result of which the moths emerge after a pupal period of about three or four weeks under average conditions.

Many of the moths developed from the overwintering larvæ emerge a few days after the petals have commenced falling from the apple blossoms, and after mating they proceed to lay their eggs. These are laid mainly on the leaves in the case of the spring brood moths at present under consideration, and after an incubation period of about ten days the young larvæ hatch out.

The young larvæ may feed for a short period on the young foliage, but they generally make for the fruit and enter it usually at the calyx or flower end in the case of this first generation. In the later generations, however, many of the larvæ enter at the side of the fruit, particularly where two fruits touch. The larvæ having entered the fruit then work their way to the core, and feed as already indicated in an earlier paragraph. The larvæ of the first generation are generally full-fed in slightly less than four weeks, at the end of which period they leave the fruit and go in search of a suitable spot in which to pupate.

The pupæ are found under pieces of loose rough bark or in cavities or cracks in the limbs of the tree; pupation may also take place under clods of earth at the base of the tree, and in fact in many other situations. The duration of the pupal stage in the first generation, like that of all other life-cycle stages, varies appreciably, but it is generally about twelve or thirteen days, which is very much shorter than in the case of the pupæ formed by the overwintering larvæ.

At the end of the pupal stage the moths emerge, feed, and mate, and in three or four days after mating the females start egg-laying, thus commencing the next or second generation.

There is usually only one brood of codling moth each year in England and in Northern Europe, but in Queensland two generations occur regularly, and a third is quite possible.

CONTROL MEASURES.

The following control measures are available for combating this pest:—

(1) Spraying with arsenate of lead;
(2) Bandaging of trees;
(3) Destruction of windfalls;
(4) Cleaning up packing sheds;
(5) Cleaning bark of infested trees;
(6) Judicious thinning of heavy crops.

While each of these control measures is undoubtedly productive of much good, no one of them will alone give thoroughly effective control. It is therefore strongly recommended that all six measures be enforced, and if that is done there is every reason to believe that in a normal season losses will be reduced to relatively small proportions.

Spraying with arsenate of lead must be repeated several times, and the first spray should be applied as soon as the petals have fallen and before the calyx-cup has closed. The lobes or sepals of the calyx are wide apart for about a fortnight after the fall of the petals, and a spray applied before these lobes close up coats the calyx-cup with the poison. As already mentioned in the discussion of the life history of this pest, the great majority of the larvæ of the first generation enter at the calyx end of the fruit, and in doing so they are poisoned by the arsenate of lead which they swallow when eating their way in at the calyx. The correct time at which to apply the calyx spray is indicated in fig. 7 of Plate 3.

The mortality among the young larvæ is by no means exclusively caused by their attempting to enter at the poisoned calyx, for observations have shown that many perish before reaching that portion of the fruit. Earlier remarks indicated that many of these larvæ feed for a brief period on the tissue of the leaves on which they hatch out, and in doing so they will in many cases swallow fatal doses of the arsenate of lead with which the foliage is coated.

The calyx spray is of great importance in the control of this pest, and it should invariably be applied. It must, however, be succeeded by several cover sprays at intervals of two or three weeks, the object of these sprays being to coat the growing apple with poison.

The strength at which the arsenate of lead is applied varies to some extent, some investigators recommending 1 lb. of the powder arsenate of lead to 50 gallons of water, or 2 lb. of the paste arsenate of lead to a similar quantity of water. Other workers recommend sprays that are 50 per cent. stronger—i.e., 1½ lb. of powder arsenate of lead to 50 gallons of water. The weaker strength is that at present recommended in Queensland.

No matter how carefully spraying may have been attended to, an appreciable proportion of young codling moth larvæ will escape poisoning, and hence spraying must be supplemented by other control measures.

The bandaging of trees is one of these important supplementary control measures, and its adoption is definitely recommended. It will be found that many of the larvæ, on leaving the fruit to locate suitable spots for pupation, assemble under the bands, and if these are periodically examined at intervals of a week the insects found thereunder can be destroyed. The success of this control measure will largely depend on the trees having previously been cleaned of cover under which the larvæ might otherwise wish to pupate, e.g. under pieces of loose bark. The bandages can be made from a piece of strong cloth 10 inches wide, which is folded to form a double band 5 inches wide, and is then bound tightly round the tree and held in position by a nail. It is recommended that in the Stanthorpe district bandages be in place on the trees at the end of October.

The destruction of windfalls is another important measure of value in reducing codling moth infestation. If windfalls attacked by codling moth larvæ are allowed to remain on the ground, many of the larvæ contained therein will survive and complete their development, thus still further intensifying the infestation.

The cleaning up of packing sheds is a valuable precaution that should not be overlooked, because many of the larvæ in infested fruit leave the fruit when in the packing sheds and select suitable crevices in which to spin their cocoons and overwinter. The flooring boards, packing benches, and empty cases should therefore be carefully inspected, and, if necessary, treated with boiling water in an endeavour to kill any larvæ that may have taken shelter therein.

Mention has already been made of the fact that, in bandaging, success will be most marked when the banded trees are thoroughly cleaned up, so as to eliminate shelter spots to which the larvæ may go for pupation in preference to assembling under the bands. For this reason it is highly desirable to close up any cavities or cracks that may occur on the branches or main stem of the trees, and also to scrape off any loose bark that may be present. For the former purpose sticky clay or putty is satisfactory, and for the latter any suitable blunt instrument may be used.

Finally some reference must be made to the fact that the thinning of fruit, where a heavy crop of apples has set, is of some material advantage so far as codling moth control is concerned. A judiciously thinned crop can be sprayed in a much more satisfactory manner than one that has not been so treated.

Prominence has recently been given to the trapping of the moths themselves in glass containers baited with suitable attractants. This possible method of control was tested fairly extensively during the 1926-27 season in the Stanthorpe district, but the results obtained, under the conditions then prevailing in that district, were very disappointing, and trapping of the moths cannot be added to the list of control measures.

Reference must also be made to the present attempt to establish some measure of biological control. This originated in September 1927, when a colony of a very small wasp, *Trichogramma minutum* Riley, was received from California. This beneficial insect attacks the eggs of the codling moth, and when Mr. Ranger, manager of the Committee of Direction of Fruit Marketing, was in North America last year he saw the handling of this parasite by Mr. Flanders, the entomologist of the Walnut Growers' Association. Mr. Ranger was much impressed by that work, and accordingly arrangements were made to forward a colony of the parasite to Queensland. It has since been bred in Brisbane and liberated in the orchards. This is not an attempt to introduce a new parasite, the object being to artificially increase the numbers of an already established insect, thus transforming a rare species into a valuable control factor.

To summarise the control measures:—Spray with arsenate of lead, commencing with a calyx spray as soon as the petals have fallen, following thereon with several cover sprays; bandage the trees and examine regularly and destroy the larvæ assembled under the bands; destroy all windfalls; thoroughly clean the packing sheds; scrape loose bark from trees and fill up all cracks and crevices thereon; judiciously thin out heavy crops of fruit.

The Woolly Apple Aphis.

The two preceding pests just dealt with in this chapter, namely, the Queensland fruit fly and the codling moth, have every reason to be regarded as the two most important apple pests in this State. The one now under consideration is, however, a close competitor for inclusion in the category of highly destructive enemies of the apple. Like the codling moth, it has gradually become widely distributed throughout the world, and there are probably few regions in which apple-growing is now unaccompanied by its very unwelcome presence and associated losses.

The woolly apple aphis (*Eriosoma lanigerum* Hausm.) belongs to the family Aphididæ in the order Hemiptera. The popular name just quoted is that under which it has long been known in Australia, but in England it is very frequently referred to as American blight, while on the continent of Europe it is often spoken of as the blood-louse. The name blood-louse has been suggested by the stain left when the bodies of this aphis are crushed in the hand.

This pest is certainly not a native of Australia, and it would appear that either North America or Europe must accept the somewhat unwelcome responsibility for having presented it to the apple-growers of the world. It was described in Europe by Hausmann in 1802, but according to French, of Victoria, there are records of its occurrence in England as far back as 1789. The same authority also states that it is said to have occurred in Victoria as early as 1849.

NATURE OF INJURY.

The woolly aphis feeds by means of the piercing mouth parts which characterise the order of insects to which it belongs, and as a result of its feeding activities very typical gall-like malformations (Plate 4, fig. 4) are produced on the infested branches and roots, for this pest works both under ground and above ground.

It characteristically feeds in colonies and the injurious effects produced by the constant feeding of large numbers of aphids on the branches and roots must obviously be very prejudicial to the welfare of the tree. Not only is the vitality of the tree reduced by the removal of its sap, but, as a reaction to infestation, the typical deformities already mentioned are produced. While infestation may be a serious matter in trees of any age, it may even be fatal in its results on young stock. It is frequently claimed that the underground colonies of this pest feeding on the root system produce a far more prejudicial effect on the tree's vitality than the more conspicuous colonies feeding on the branches.

PLANTS ATTACKED.

Among cultivated fruits the apple is outstanding as the host plant of this pest. Infestation of pear, quince, and plum has also been recorded, but such occurrences are so extremely rare that the pest might almost be described as exclusively an apple insect at least so far as the orchardist is affected by its presence. This, however, would not be true so far as trees in general are concerned, for in the course of a detailed study of the life history of this pest in North America it was shown that it winters on the elm-trees. The mountain ash and hawthorn are also attacked in the United States.

THE APHIS.

This species of aphis is characterised by a copious secretion of wax which is deposited as a powdery bluish-white substance over the surface of the body. There is, in addition, a secretion of long waxy threads or filaments, which in the branch-feeding colonies are white and fluffy; hence the popular Australian name woolly apple aphis. These threads also occur in the root-feeding colonies, but they are there of a somewhat bluish-white tinge rather than the pure white colour so typical of the branch-inhabiting individuals.

A close examination of these white woolly masses will show that they merely screen a large number of small oval aphids which have been variously described as being dull purplish brown, slaty blue, or plum-coloured.

The life history of this species has been studied in very considerable detail in the United States, but, so far as is known, it has received but little attention in this country.

CONTROL MEASURES.

The control of the woolly apple aphis has been attempted along three distinct lines, and at the present moment it can be claimed that, in the Stanthorpe district, these three types of control measures constitute between them a very effective check upon this potentially destructive insect.

The first of the control measures referred to is the selection of trees that will be resistant to the attacks of this pest at least on the root system. This was successfully accomplished many years ago, and it has long been the practice to work apples on a stock that has shown resistance or immunity to infestation. For this purpose the Northern Spy and the Winter Majetin have been largely availed of. If the trees are worked on these blight-resistant stocks, then the orchardist need not worry about infestation on the root system, and he can concentrate his attention on the infestation on the branches. This success in eliminating the underground colonies of the aphis constituted a very marked advance in the direction of achieving effective control.

For the control of the branch infestation spraying has been much in favour, nicotine sulphate being employed in summer and oil sprays in winter. To effectively control these above-ground colonies the nicotine sulphate should be sprayed under high pressure close to the infested limbs, so that a drenching spray is produced and the insects thus effectively reached. The oil sprays may be used in winter, but they cannot be employed with the drenching effect referred to in the application of the nicotine sulphate sprays, otherwise excessive and injurious quantities of the oil sprays will collect at the butts of the treated trees. However, if the spraying with nicotine sulphate has been satisfactorily performed in summer and autumn, only a mist-like spray will be necessary in the case of a winter application of a miscible oil. Unfortunately, repeated spraying with nicotine sulphate is necessary for the control of the branch-infesting colonies of this pest during summer and autumn. The orchardist is particularly busy at that time of the year, and hence the necessity for frequent spraying imposes a heavy burden not only on his pocket but on his time, which is so urgently required for other operations on the orchard. The employment of a third type of control measure has, however, very materially reduced the burden of spraying; in fact, it has at present largely but not completely eliminated the necessity for doing so. Long may that continue to be the case.

The third line along which control has been attempted is the utilisation of the services of natural enemies—i.e., the biological control method. Much has been written of late years on this subject, and some

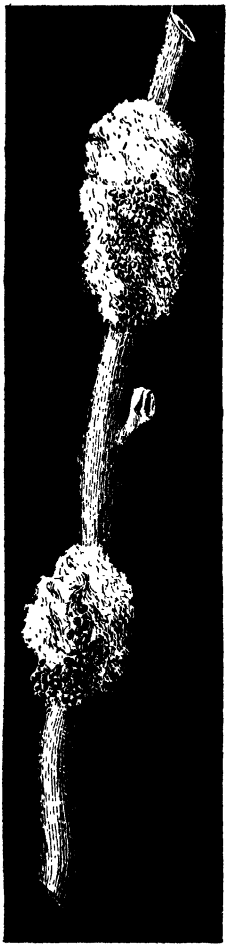


Fig 4

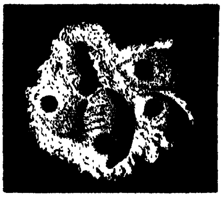


Fig 5

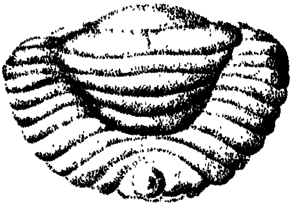


Fig 1

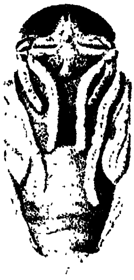


Fig 2

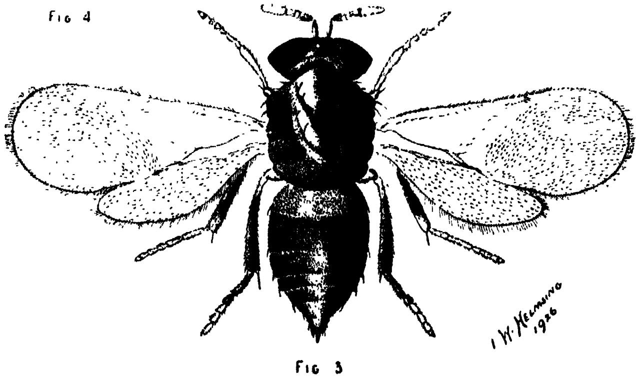


Fig 3

Plate 4.—The Woolly Aphis Parasite (*Aphelinus mali* Hald.).

Fig. 1.—Larva of *Aphelinus mali* × 40.

Fig. 2.—Pupa of *Aphelinus mali* × 40.

Fig. 3.—Imago or adult of *Aphelinus mali* × 30.

Fig. 4.—Twig showing parasitized and unparasitized woolly aphis, all those on the lower colony being parasitized, whereas only a few on the lower edge of the upper colony have been attacked. Natural size.

Fig. 5.—Aphis showing the emergence holes of *Aphelinus mali* × 6.

strikingly successful results have been obtained in its application. One must never, however, lose sight of the fact that the prospects of success warrant the expenditure of time and money on this control measure in only a comparatively limited number of problems. However, in the case of woolly apple aphis infestation in the Stanthorpe district it appears to have justified itself in a highly gratifying manner.

The attempt at biological control commenced in 1923 when a colony of a small wasp parasite, *Aphelinus mali* Hald. (Plate 4, fig. 3), was obtained from New Zealand by Hubert Jarvis. This parasite is a native of North America, whence it had been introduced to the former country by the officers of the Cawthron Institute.

The parasite in question is a typical Chalcid wasp measuring about $\frac{1}{25}$ inch in length. It lays its eggs in the bodies of the woolly apple aphis, and the larvæ (Plate 4, fig. 1), hatching from these eggs, feed on the body contents of the destructive insects. When full-grown, the parasite larvæ transform to pupæ (Plate 4, fig. 2) within the woolly aphids, which are by that time dead and consist merely of hard empty shells. In this stage the body contents of the parasites are completely reorganised and the adult wasps are produced. These emerge by cutting circular holes in the shells of their dead hosts (Plate 4, fig. 5).

As already indicated, this introduction has been very successful and has materially reduced the cost of controlling woolly apple aphis.

The San José Scale.

The San José scale (*Aspidiotus perniciosus* Comstock) is probably one of the most widely known of the many pests attacking deciduous fruit-trees. Furthermore it is conspicuous among the most destructive of the numerous scale insect pests. It first acquired notoriety in the San José district of California some fifty or sixty years ago, hence the name by which it is popularly known. It is believed to be a native of China, whence it was unfortunately imported to California. This undesirable immigrant is thought to have reached Australia in 1894.

NATURE OF INJURY.

This pest attacks the trunk, branches, leaves, and fruit of infested trees (Plate 5, figs. 8, 9, 10), and a characteristic reddish or pink discoloration is usually associated with its presence wherever it is feeding on the plant tissue. If immediate steps are not taken to deal with the pest when it shows up in an orchard, the infestation increases with quite extraordinary rapidity, and may become sufficiently acute to eventually kill the attacked trees. This insect, like all other species of scale insects, feeds by sucking the plant sap, and the opinion has been expressed that it has a more prejudicial effect on its host plant than any other scale insect attacking fruit-trees.

PLANTS ATTACKED.

The San José scale has a very wide range of food plants, and among the deciduous fruit-trees attacked mention may be made of the following:—Apple, apricot, cherry, peach, pear, plum, prune, and quince.

LIFE CYCLE STAGES.

The female scale when full-grown (Plate 5, fig. 6) is roughly about the size of a pin-head, and is almost circular in outline and is slightly

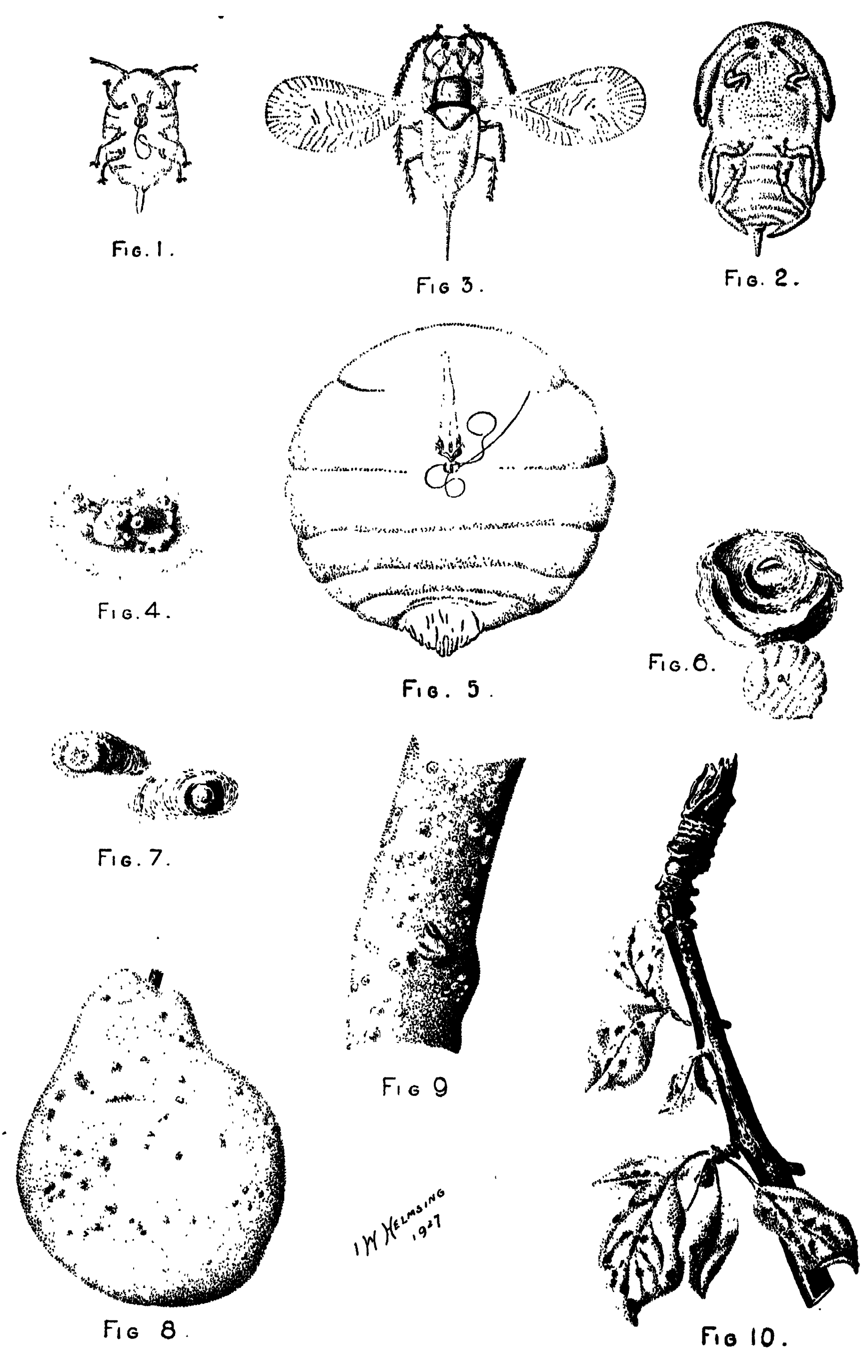


Fig. 1.
Fig 3.
Fig. 2.
Fig. 4.
Fig. 5.
Fig. 6.
Fig. 7.
Fig 9
Fig 8
I W Helmsing 1927
Fig 10.

Plate 5.—The San José Scale (*Aspidiotus perniriosus* Comstock).

Fig. 1.—Young larva × 57.
Fig. 2.—Pupa of male × 57.
Fig. 3.—Adult male × 32.
Fig. 4.—Colony of scales in various stages of development × 4.
Fig. 5.—Adult female × 32.
Fig. 6.—Adult female scale turned over to reveal the insect itself × 12.
Fig. 7.—Male scales × 12.
Fig. 8.—Pear fruit, showing infestation.
Fig. 9.—Apple twig, showing infestation.
Fig. 10.—Plum twig, showing infestation.

convex. The scale itself is a greyish-brown colour, and is merely a waxy secretion with incorporated moulted skins which covers and protects the actual insect underneath. The soft-bodied yellowish insect (Plate 5, fig. 5) is circular in shape and is legless.

The male scale (Plate 5, fig. 7) is smaller than the female scale, and is somewhat different in shape, being distinctly more elongate. The adult male insect (Plate 5, fig. 3) is totally different from the female, and is a small delicate insect provided with a single pair of wings.

The young scale insects (Plate 5, fig. 1) are lemon yellow in colour, and possess three pairs of legs. They are very small, and can just be seen with the naked eye.

LIFE HISTORY.

The males and females mate, and several weeks after mating the females commence to give birth to living young, as many as several hundreds being frequently produced by a single female. The small lemon-yellow young or larva leaves the protection of the mother scale and crawls over the tree in search of a suitable spot at which to settle down. Having found such a spot, which is generally obtained in a few hours, the young insect inserts its long, thin, threadlike, piercing mouth parts into the plant tissue and commences sucking the sap. The body gradually becomes covered with waxy threads, and eventually the typical protective scale is produced. The young insects moult in about a fortnight, and they then lose their legs. The males undergo two more moults and then emerge as delicate two-winged insects. The females moult a second time and remain legless, wingless insects. They then mate with the males and subsequently commence to produce living young. Definite figures with respect to the number of generations produced each year in Queensland are not available, but in North America it is believed that three or even four may be produced each year. Bearing in mind this fact, coupled with the rate of production of young per female, it is not difficult to understand that, where this pest is neglected, infestation may rapidly become so serious that the bark is smothered in a mass of scales which give it a greyish scurfy appearance.

CONTROL MEASURES.

San José scale in a well-established orchard can be quite effectively controlled by spraying during the winter months, using either lime sulphur or miscible oils. If only a few infested trees occur in a very young orchard, it is probably worth while to destroy these trees in the hope of exterminating the pest for the time being, although sooner or later the pest will come in from neighbouring orchards. Nursery stock should be fumigated to destroy any scale insects that may be present.

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DISEASES OF DECIDUOUS FRUITS.*

By J. H. SIMMONDS, M.S.c., Plant Pathologist.

The diseases discussed in these notes are downy mildew, oidium or powdery mildew, and anthracnose or black spot, all attacking grapes; powdery mildew of pome fruits; prune rust, brown rot, black mould rot, and leaf curl attacking various stone fruits.

Downy Mildew of Grape Vine.

Downy mildew is the most serious disease with which grape-growers have to contend. It is now distributed throughout practically all the chief vine-growing centres of the New and Old Worlds wherever climatic conditions are suited to its development. Australia was fortunate in being one of the last countries to be visited by this disease, which only appeared in epidemic form during the 1917-18 growing season. The malady is one which can be effectively controlled by the application of a fungicide, and hence spraying has become a matter of general routine with all efficient growers except in the drier centres of the State.

SYMPTOMS.

All parts of the vine, including stems, leaves, and bunches, may be attacked in their younger stages. As the tissues mature they become less susceptible to infection. On the leaf the first symptoms appear as light greenish-yellow spots of a roughly circular or sometimes angular shape. When held up to the light these will be seen to be of a clearer and more transparent appearance, giving rise to the name of "oil-spot" which is applied to this stage. If the weather is moist, a delicate white downy growth will be produced on the under surface of the spots as the fruiting bodies of the fungus causing the disease are developed (Plate 9, fig. 1). During hot and dry conditions the fructification will not take place, and the spot turns brown and dries out. By coalescence of the spots large areas of the leaf surface may be affected. The presence of even a small amount of dead tissue may cause distortion of the developing leaf. Affected leaves usually fall off prematurely.

The fruit may be attacked at any period of its development until it commences to colour. When infected during the early stages of growth the bunch usually becomes covered with a downy fungus growth, which has suggested the name of "grey mould" for this particular form of attack. If the berry is approaching maturity the mould is rarely produced. In either case the fruit eventually becomes brown and shrunken and dries up (Plate 9, fig. 1).

CAUSE.

The disease is due to a fungus (*Plasmopara viticola*) belonging to the Peronosporaceæ or downy mildew group, from which are derived many very important plant parasites. When infection has taken place the fungal threads or mycelium ramify between the cells of the plant tissue, absorbing nourishment from these by means of short haustorial branches. After an incubation period of about seven days, during which a definite oil-spot has been formed, the parasite is in a condition to produce its fruiting stage should the right weather conditions be available. Spore formation will take place readily at a temperature from about 60 to 80 deg. Fahr., provided abundant moisture is present. Short aerial hyphæ grow out four to eight together through the openings of the stomata or breathing pores found on the lower surface. These branch and rebranch, forming a tree-like growth, and from each of the ultimate short peg-like branches there is developed a delicate thin-walled ovate spore. These spores are produced in countless numbers, and, being easily carried about by wind and rain, serve to spread the disease during the growing season. Should a spore be deposited on a leaf when moisture in the form of dew or raindrops is present, its contents will divide up into several smaller portions, each provided with two thread-like vibratile flagella. These motile structures are known as zoospores. They escape by rupture of the parent cell or sporangium, and make their way through the film of surface moisture to one of the breathing pores of the leaf, by means of which opening they gain access to the plant.

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*Reprinted from "Pests and Diseases of Queensland Fruits and Vegetables," by Robert Veitch, B.Sc., F.E.S., and J. H. Simmonds, M.Sc., published by the Department of Agriculture and Stock, Brisbane, 1929.

The summer spores are delicate in structure and are unable to live over from one season to the next. For this latter purpose the fungus is provided with a thick-walled resistant spore known as the oospore. These are formed towards the end of the season within the tissue of the leaf, and remain associated with the rotting foliage during the winter. In the spring, if the weather is sufficiently wet to give rise to a certain amount of water accumulation round the vines, the oospore will germinate in this and give rise to a sporangium which produces zoospores as in the case of the summer spores described above. If another shower should fall and splash the zoospores on the foliage, the infection for the season will be commenced.

CONTROL.

Consideration of the life history of the organism briefly outlined above will show that for a severe outbreak of downy mildew there is necessary a certain temperature combined with abundant moisture. The temperature during the Queensland season, except on abnormally hot days, is quite suitable for mildew development. Rain during the early part of the season in sufficient quantity to provide the necessary moisture requirements for the starting of an attack is always of likely occurrence, while the summer rains provide ideal conditions for its epidemic development. Hence any grower who wishes to make certain of his crop should be prepared to carry out the undermentioned spraying programme, which has been proved to give adequate protection from the disease. It should be noted that the spray to be effective must be present on the leaves before the germination of the spores. Once the fungus has penetrated within the tissues of the plant all attempts to stop its development will be fruitless.

Bordeaux (6-4-40) and Burgundy (6-8-40) are the spraying mixtures commonly used, the advantages lying with the former. Applications should be made as follows:—

(1) As soon as the shoots have reached a few inches in length;

(2) Just before the flowering period:

(3) As soon as the young fruit has set;

(4) Additional applications will depend on weather conditions.

If this is at all wet the vines should be sprayed as often as necessary to keep the foliage well covered. Some growers make it a practice to spray once a week throughout the season until the fruit is coloured.

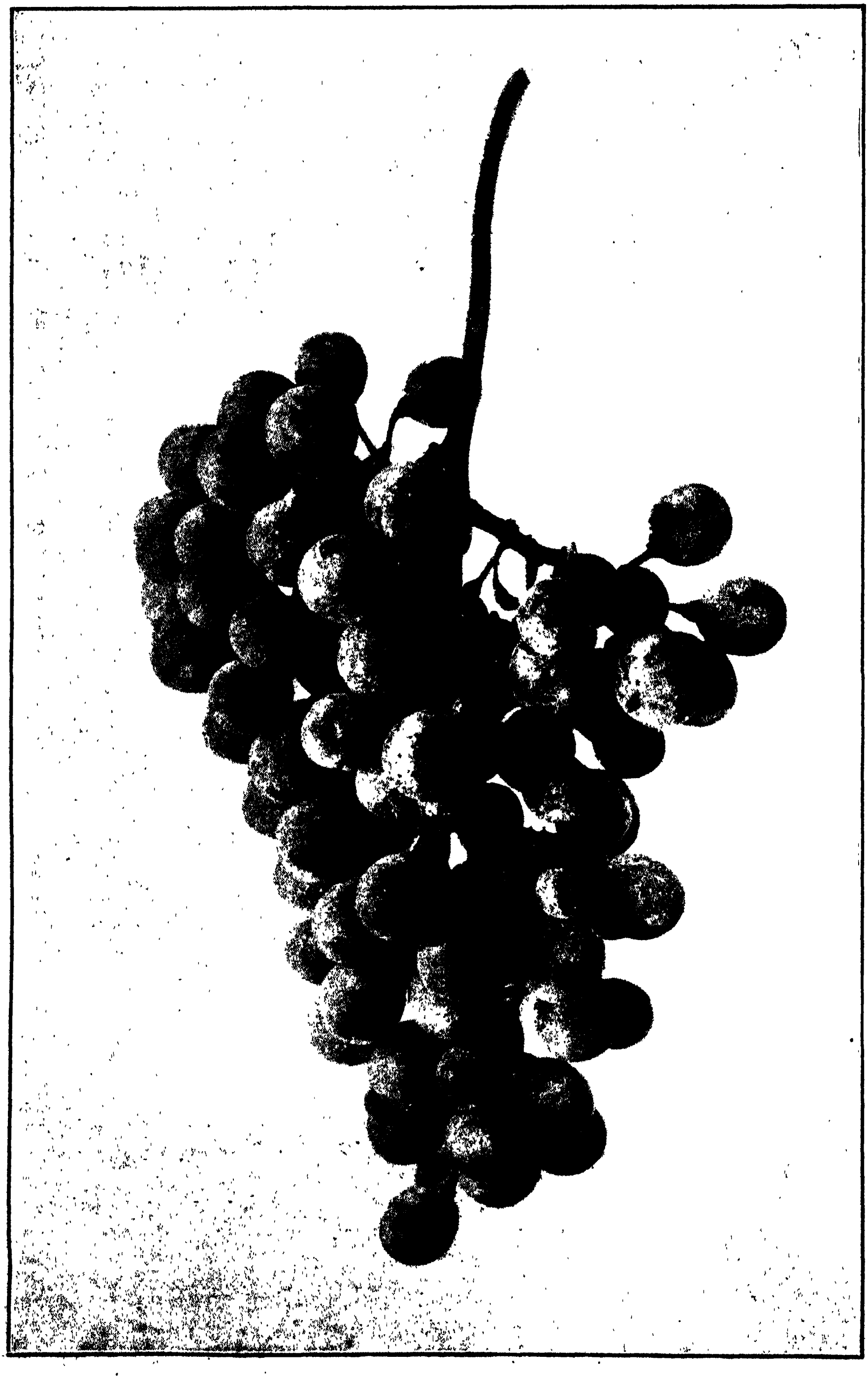


PLATE 6.—OIDIUM OF THE GRAPE.

Oidium or Powdery Mildew of Grape Vine.

Powdery mildew is a disease that has been in Queensland for many years and is quite familiar to most growers. All the younger green parts of the vine, including leaves, canes, and fruit, may be attacked, the damage done depending very largely upon weather conditions. Warm and moist but not necessarily wet weather is most suitable to the development of Oidium.

SYMPTOMS.

On the leaf the fungus appears as greyish-white floury patches on the upper and lower surfaces but more conspicuous on the former. This can usually be easily distinguished from the more elevated downy growth found on the under surface of leaves attacked by downy mildew. The white powdery covering may also develop on the young shoots and the canes. This attack will result in a cessation of growth, and if the part is in the immature developing stage deformation may take place.

The most severe damage takes place when the bunch is affected. If this happens before or shortly after flowering, the flowers and small developing fruit which become covered with the mildew soon dry up and drop off. When older fruit becomes mildewed the growth of the skin is retarded and splitting often occurs. Their appearance is greatly impaired even when this cracking does not take place. (Plate 6.)

The retarding effect of powdery mildew on the growth of the vines during one season will cause a reduction in the quantity and quality of the crop the following year.

CAUSE.

Powdery mildew is caused by a fungus parasite now known as *Uncinula spiralis*. The form in which this organism is commonly met with was first described under the name *Oidium Tuckeri*—hence the common name of Oidium. Later a second and higher form of the fungus was discovered which necessitated the change to the above.

This fungus differs from the organism causing downy mildew in that it belongs to the ectoparasitic type. This difference should be noted since it is of special importance when considering control measures. The fungus grows entirely on the outside of its host, where the mycelial threads form a fine white web-like growth over the affected parts. From the surface mycelium small knob-like processes or haustoria are given off which penetrate the epidermal cells and from them absorb nourishment. The injury done to the plant cells in this way gives rise to dark specklings on the surface of the region affected.

If the weather is warm and moist the fungus will soon proceed to the formation of the fruiting stage. Short upright branches are given off which cut off in succession three or four clear oval spores. These spores serve to spread the disease during summer. They germinate by producing a delicate thread-like germ-tube which commences a superficial growth over the plant surface as before. Oidium spores need for their germination only a sufficiently moist atmosphere to prevent desiccation. The water film so necessary for the zoospores of downy mildew need not be present.

Besides this summer spore a resting spore is produced towards the close of the season. It is of a type which places the fungus in the large group known as the Ascomycetes or sac fungi. This reproductive body consists of a minute rounded structure appearing as a black speck on the leaf surface. Radiating from the surface of these perithecia, as they are called, are a number of appendages, while within are contained about six sac-like cells or asci each containing four to six ascospores. The ascospores reach the foliage in the spring and commence the new season's infection.

In some countries, of which Queensland is one, the ascospore stage does not appear to occur except perhaps rarely, and it is possible that in this case the fungus overwinters by means of summer spores and mycelium hibernating among the dormant buds of the vine.

CONTROL.

On account of the ectoparasitic nature of the causal fungus one is able actually to cure as well as prevent an attack of powdery mildew. Sulphur applied in the form of a dust will cause the death of the superficial mycelium and spores.

Application should be made as follows:—

(1) When the new shoots are about 12 inches long.

(2) When the vines are in flower. In addition to protecting the young fruit, sulphur applied at this time has an exceedingly beneficial action on the setting of the grapes.

(3) Further applications should be made whenever the disease shows signs of development.

Sulphuring is best done on a warm day, but an application during exceptionally hot weather should be avoided, as some foliage-burning may occur under these conditions.

Anthracnose or Black Spot of Grape Vine.

Anthracnose is a disease which does not often appear in the epidemic form which may be assumed by the two mildews; nevertheless, during wet seasons considerable damage may result from its presence in individual vineyards.

SYMPTOMS.

The disease makes its appearance on the early spring growth. The young leaves, tendrils, and shoots develop black patches of dead tissue which lead to a stunting and distortion of the expanding organs. The most characteristic symptoms are displayed by the lesions on the canes. These appear first as small dark-brown or black spots. The fungus responsible for their development extends through the tissue both radially and in towards the pith, breaking down the plant cells in its progress, with the result that a more or less conspicuous open black scar or canker is produced. (Plate 8, fig. 2.)

If the bunch is affected in its early stages it may be reduced by destruction of flowers and fruit to nothing more than the blackened and withered fruit-stalks. When older berries are attacked a bird's-eye spotting results. The spots are slightly depressed circular areas having a greyish-pink centre surrounded by a dark-brown to black margin. (Plate 7.) Besides the unsightly appearance, the hardening of the skin may cause splitting to take place.

CAUSE.

Anthracnose of the grape is due to the attack of a fungus (***Manginia ampelina***) which resembles in general characters the one responsible for bean anthracnose. Spore formation takes place in the base of the cankers and on the fruit-spots, where the spores in mass give a greyish-pink appearance to the affected area. Clusters of short upright hyphæ

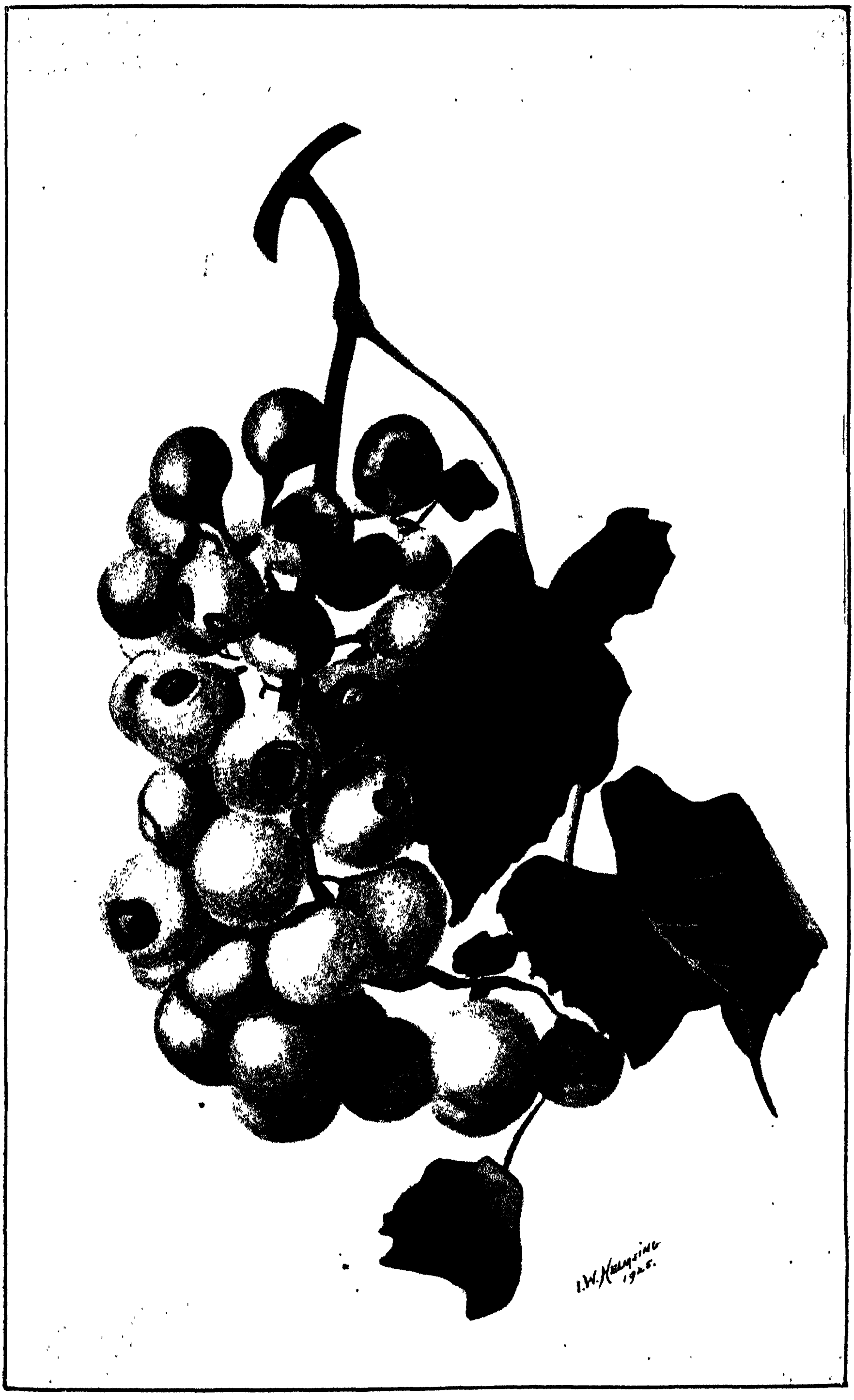

I.W. Helmsing 1925.

Plate 7.—Anthracnose of the Grape.

arising from beds of interwoven fungal threads cut off from their tips numerous clear oval spores. These tend to stick together in mass, so that spore dispersal and spread of the disease is not so rapid as in the case of the mildews.

The fungus overwinters principally in a vegetative form in old scars. Towards autumn the fungal threads become massed together in the more superficial regions of the stem cankers, and condense into a dark thick-walled resistant form known as a sclerotium. As soon as moist or wet weather occurs in the spring, the exposed portions of these sclerotia produce from their surface the minute spore-bearing structures similar to those developed the previous season on the young lesions. The spores thus produced serve to infect the early spring growth and from the spots so formed the distribution of the disease takes place as before.

CONTROL.

It has been found as a result of long experience that anthracnose can best be controlled by attacking the fungus in its hibernating stage. For this purpose any vines which bear the cankers formed during the previous growing season should be thoroughly swabbed with the following mixture:—

Iron sulphate	20 lb.
Sulphuric acid	8 lb.
Water	10 galls.

The iron sulphate is dissolved in 10 gallons of warm water in a wooden vessel. The sulphuric acid is then added by carefully pouring in a thin stream, with constant stirring so as to avoid splashing and excessive heating. This solution will corrode metal vessels, and even wooden ones are best covered with tar or paraffin.

The solution should be applied just before the buds commence to move. Previous to this all badly diseased and unwanted wood will have been removed and burnt. The swabbing is conveniently done by means of a brush or small mop. Care must be taken that the whole vine and especially any old scars are thoroughly wetted.

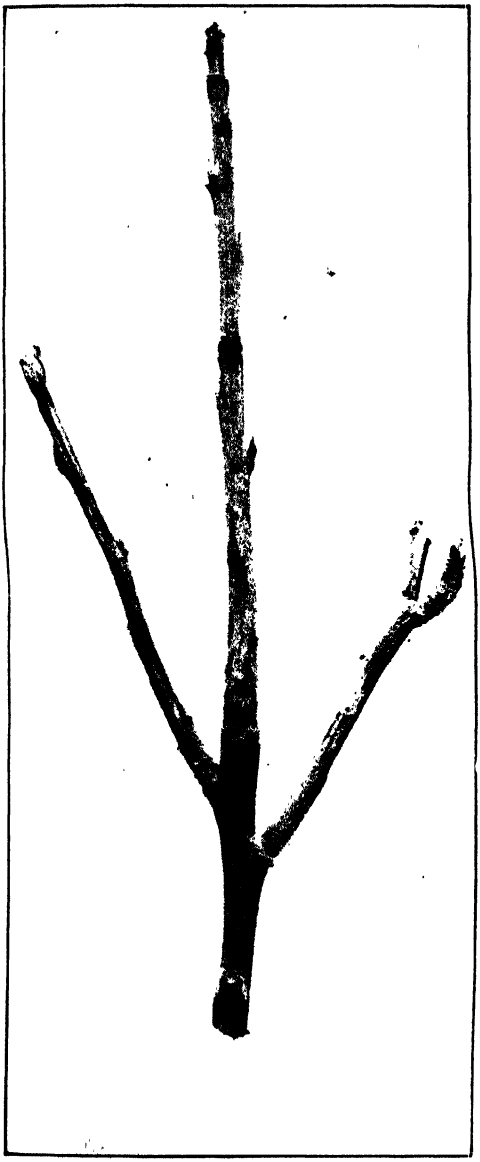
Although the swabbing treatment will greatly reduce the amount of spring infection, it cannot be expected that this will be eliminated entirely. It is therefore advisable as a further precaution to spray the vines when the shoots are a few inches in length, and again a fortnight or three weeks later, with Bordeaux mixture of 6-4-40 strength. The applications of Bordeaux made subsequently for control of downy mildew will serve as a further check on anthracnose development.

Powdery Mildew of Apple.

The apple, pear, and quince may all at times be attacked by powdery mildew, but of these the apple is by far the most seriously affected. The fungus causing this mildew is not so dependent on wet weather for its development as are many other fungus parasites, and therefore damage may result from this disease even during a fairly dry season.

SYMPTOMS.

All current season growth in the form of shoots, leaves, blossoms, and occasionally fruit is liable to attack. On the under surface of young leaves greyish-white powdery patches appear. These enlarge and may cover the whole leaf and then extend down the stalk to the twig. Affected



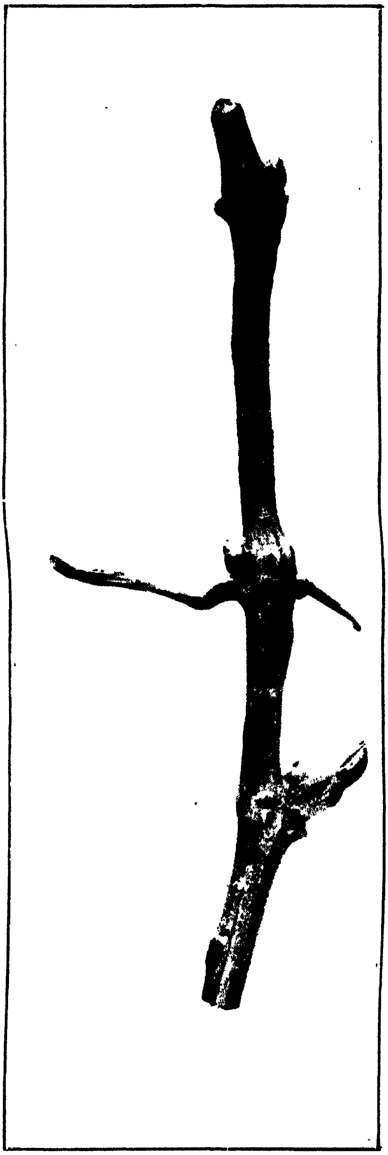


Plate 8.

Fig. 1.—Apple Twig affected with Powdery Mildew. (Note the white fungal coat and resulting dieback.)

Fig. 2.—Grape Vine exhibiting the canker stage of Anthracnose.

leaves have their tissue hardened, with the result that subsequent growth is restricted and the foliage is stunted and deformed. The same white fungus growth will spread over the young twigs, and will also appear on some of the buds. In the latter case the floral parts become shrivelled and no fruit is formed. Sometimes young fruit are affected soon after they have set, with the result that a russeting is produced. After leaf-fall the affected twigs will be easily picked out by their white, silvery appearance. Many of the buds will be found to be dead, and the shoot itself may be killed back. (Plate 8, fig. 1.)

EFFECTS.

Although the fruit often escapes injury, less obvious damage of a serious nature may result from mildew attack. The reduction in healthy foliage growth will mean a diminution in food supply, with consequent reduction in quantity and quality of the next crop. When the twigs are badly attacked the growth of next year's buds will be greatly interfered with, and these as well as part of the terminal itself may be completely destroyed. The setting of the fruit will be reduced by blossom infection in the spring.

CAUSE.

The cause of apple powdery mildew is a fungus (*Podosphœra sp.*) which is allied to the organisms producing powdery mildew of the grape, cucumber, &c. Like these the apple fungus is ectoparasitic in its habit. In other words, the fine threads making up the fungal plant lie entirely on the surface of the host plant, nourishment being obtained by means of short suckers which penetrate the epidermal cells. It is these superficial mycelial threads which give rise to the white patches mentioned above. From the surface growth short upright threads are given off, and these, by a succession of transverse partitions, cut off numbers of delicate oval spores which, when distributed by wind and rain, serve to spread the disease throughout the orchard.

Besides these summer spores or conidia, the fungus forms towards the latter part of the season another type of fruiting body known as a perithecium. These are dark-brown rounded bodies just visible to the naked eye, clusters together forming dark areas over the previously white patches. Within the perithecia are produced rounded sacs, each of which contains about eight ascospores. The ascospores serve to some extent to carry the fungus through the cold months. The chief method of overwintering is, however, by means of fungal threads which penetrate among the scales of the leaf and flower buds and there hibernate until these organs commence to open in the spring. The fungus then grows along with the developing buds, and affects the young leaves and flowers as described above.

CONTROL.

Since the fungus overwinters in affected twigs, all those exhibiting the white appearance denotive of the presence of mildew should be removed and burnt during the winter pruning.

The trees should be sprayed with lime sulphur 1 in 50—

(1) Just before the flowers open.

(2) When the last petals are falling. N.B.—For this and the next application the fungicide may be combined with the lead arsenate of the codling moth spray.

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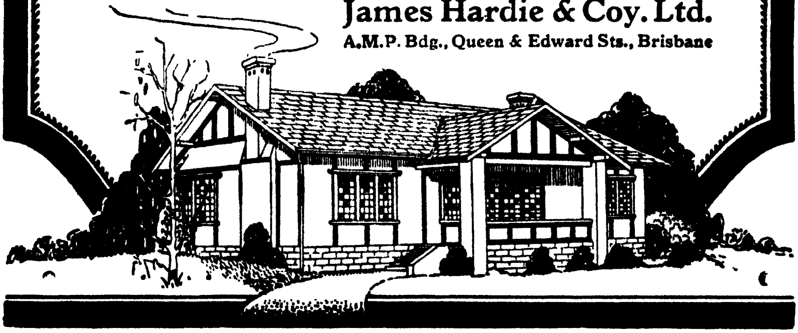

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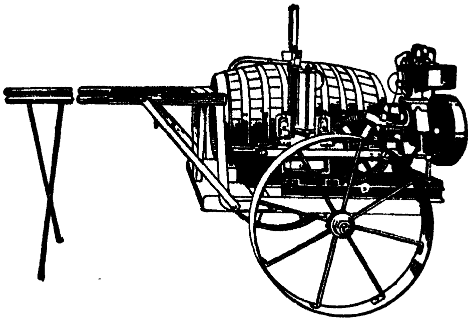

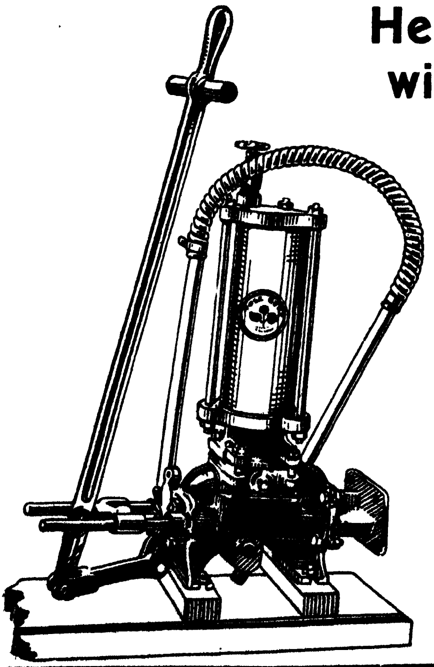

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(3) About a fortnight after the last.

(4) Further applications will be necessary should powdery mildew again make its appearance.

Prune Rust.

Prune rust is a disease to which most of the cultivated varieties of stone fruits are subject, the peach and plum being most seriously affected. The disease is world-wide in distribution, and occurs in practically every region where its host plants are cultivated.

SYMPTOMS.

The presence of prune rust is first denoted by the appearance on the upper surface of the leaf of somewhat angular spots of a greenish-yellow colour. These are few and scattered, or more numerous when they may become confluent and form large discoloured areas. The spots later darken to various shades of brown as the tissue dies and dries out. Frequently the leaf falls before this stage is reached. On the under surface of these spots the fruiting bodies of the fungus causing the disease appear as clusters of small brown powdery pustules (Plate 11, fig. 1). In the case of the peach the disease may also affect the young branches with the production of somewhat elongated brown pustules which rupture the bark. During a bad attack when rust appears early in the season, the fruit of both peach and apricot may become disfigured with brown slightly sunken areas as a result of infection by the rust fungus. Occasionally the stems and fruit of other varieties may be attacked.

EFFECTS.

Rust usually attacks the lower leaves first, and these sooner or later turn somewhat yellow and fall. The disease then progresses more or less rapidly, according to weather conditions, up the branches, so that finally there may be left only a small tuft of leaves at their tips. Spotting may begin to appear about December or January, but during a fairly dry season it is not usually until the approach of autumn that the main defoliation occurs. It is on this account that some orchardists consider the effect of prune rust to be merely the leaf-fall natural to the approach of winter, and take no steps to combat a disease which, given the right climatic conditions, may be the cause of considerable loss.

It must be remembered that, since the peach, for example, produces its fruit on the previous season's wood, the premature loss of leaf in the one season, by reducing the development of this bearing wood, may affect the next season's crop. During a wet season defoliation may take place before the fruit has fully matured, with the result that the crop will be of poor quality or rendered worthless by sun-scald. Spotted peaches are unsightly in appearance, and, as the lesion extends some distance into the flesh, the fruit is rendered unfit for canning.

CAUSE.

Prune rust is caused by a fungus (*Puccinia pruni-spinosæ*) which, like other rust fungi, exhibit more than one fruiting stage. The more common spore form, which serves to spread the disease during the current season, is known as the uredospore. This is a somewhat angular brown spore produced from the tips of short erect fungal threads or conidiophores, which are closely aggregated together to form the pustules or

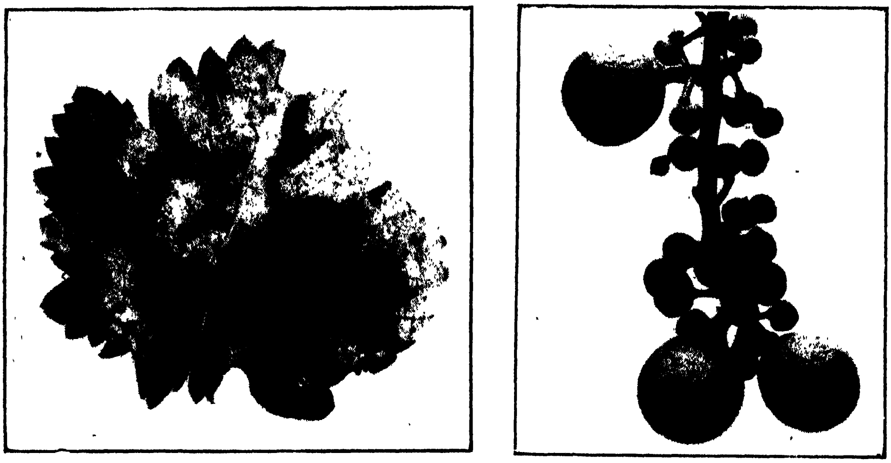


Fig. 1.—Downy Mildew of the Grape.

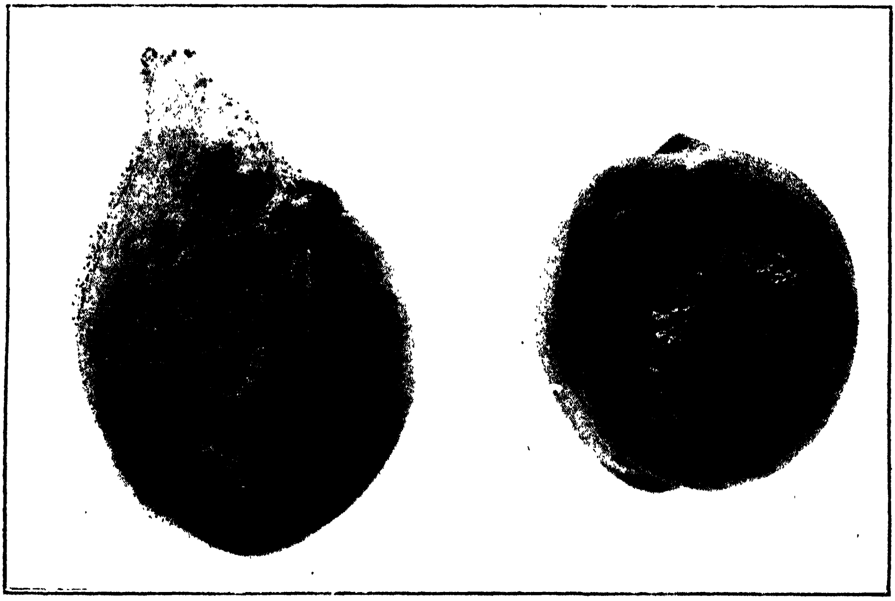


Fig. 2.—Two Peaches illustrating the difference between Black Mould Rot (left) and Brown Rot (right).

Plate 9.

sori mentioned before. Towards the autumn there may appear, more especially on the plum, pustules, of a dark-brown almost black colour. In these sori are borne a somewhat thicker and more resistant two-celled spore, known as the teleutospore, which serves to carry the fungus over the winter and creates fresh infection in the following spring. A warm wet season is most conducive to rust development.

CONTROL.

1. Prune out all infected twigs.

2. So far as is practicable, burn or plough under the fallen leaves, on which the fungus spores may be present in enormous numbers.

3. Spray as follows:—
   (*a*) Bordeaux (6-4-40) or lime sulphur (1 in 10) just before the buds commence to swell.
   (*b*) Bordeaux (4-4-40) or lime sulphur (1 in 50) as the leaves are expanding. Owing to the susceptibility of peach foliage to Bordeaux injury, peaches should receive the latter spray. Care must be taken that the fungicide reaches both sides of the leaves.
   (*c*) Should rust make its appearance later in the season, the tree should receive a further spraying with lime sulphur (1 in 80).

Brown Rot of Stone Fruits.

Brown rot is probably the most serious disease affecting stone fruit in Queensland. Peaches, nectarines, and plums suffer most. Less frequently, apricots, cherries, and occasionally pome fruits are attacked.

SYMPTOMS.

Rotting of the fruit is usually the most striking symptom of brown rot, but there are other important manifestations which are often overlooked. The disease may commence in the early part of the season as a blossom blight. The floral organs turn brown and wither up but usually still remain attached. If the weather is moist, light-brown powdery spore masses, formed by the fungus causing the disease, may appear on the affected portions. The young twigs, and occasionally the leaves, may be attacked, either by direct infection by the fungus working down from diseased flowers or from spores developed on old mummied fruits. The fungus may pass through the smaller twigs into an older branch, and there produce a large irregular wound or canker.

The fruit may be attacked at any period of its growth, though it is more commonly affected when approaching maturity or during storage. The first symptoms appear as a small brown spot on the skin of the fruit, often associated with a slight injury. If the atmosphere is moist this spot will enlarge rapidly and may involve the whole fruit in twenty-four to forty-eight hours. When the brown area is an inch to an inch and a-half in diameter the fungus usually commences to form its fruiting stage. This appears on the surface of the affected region as light greyish brown powdery tufts often arising in more or less concentric rings (Plate 10, fig. 2). The fruit rot is at first soft, but later the decomposition ceases and the flesh dries out with the production of a firm, dry, shrunken object commonly known as a "mummy" (Plate 10, fig. 1). In pome fruits there is a tendency for the rotting fruit to turn black rather than brown.

CAUSE.

Brown rot is due to the attack of a fungus (*Sclerotinia fructicola*) belonging to the Ascomycetes or sac fungi, and in common with many other members of the group exhibits two distinct methods of reproduction. The common form met with in Queensland is known as the monilia stage. Clusters of thread-like hyphæ push through the surface of the fruit, branch once or twice, and then divide up into bead-like chains of cells which are cut off as spores when mature. It is masses of these structures which form the greyish tufts described above.

The second and perfect stage of the fungus is found (apparently rarely in Queensland) in connection with old mummies which have lain on the ground for a year or more. There is developed from the fungus mycelium within the dried fruit small-stalked saucer-shaped structures. The upper surface of these receptacles consists of narrow, cylindric, sac-like cells, each of which contains eight smaller ascospores. In countries where this stage is produced in quantity the ascospores serve to start the spring infection of the blossoms.

In Australia the fungus overwinters as dormant mycelium, either in cankers and invaded twigs or in the mummified fruit lying on the ground or still attached to the tree. Within the tissue of these organs the massed fungal threads live through the winter in all security. At the approach of warm, moist, spring weather the mycelium again becomes active and bursts through the surface layers to form the greyish-brown tufts of spores by means of which the spring infection commences.

CONTROL.

1. Prune out all twigs whose appearance might suggest infection with brown rot, as otherwise they may be the means of carrying over the disease to the next year.

Carefully remove all mummied fruit and collect those already fallen and destroy by fire or burying.

2. Spray with a fungicide. Owing to the ease with which the peach and some other stone fruits are injured by the common spray mixtures, it is difficult to obtain a spray which will be sufficiently potent against brown rot and yet not injure the plant. C. C. Brittlebank, in Victoria, has lately tried out the following schedule on peaches with considerable success:—

(1) Just before the buds begin to swell, spray with lime sulphur 1 in 9 of Baumé 32 deg.

(2) As buds show pink: Lime sulphur 1 in 35.

(3) As the fruit begins to colour: Lime sulphur 1 in 80.

(4) One month to three weeks before picking: Lime sulphur 1 in 100.

3. Examination of affected fruit at the market would suggest that an injury of some form is often responsible for brown rot infection. Care should therefore be exercised during picking and packing operations to see that injuries in the form of bruises, scratches, &c., are so far as possible avoided. Affected fruit should not be touched while handling sound ones, and all rot material should be kept out of the packing shed. When possible avoid picking and packing when the fruit is wet.

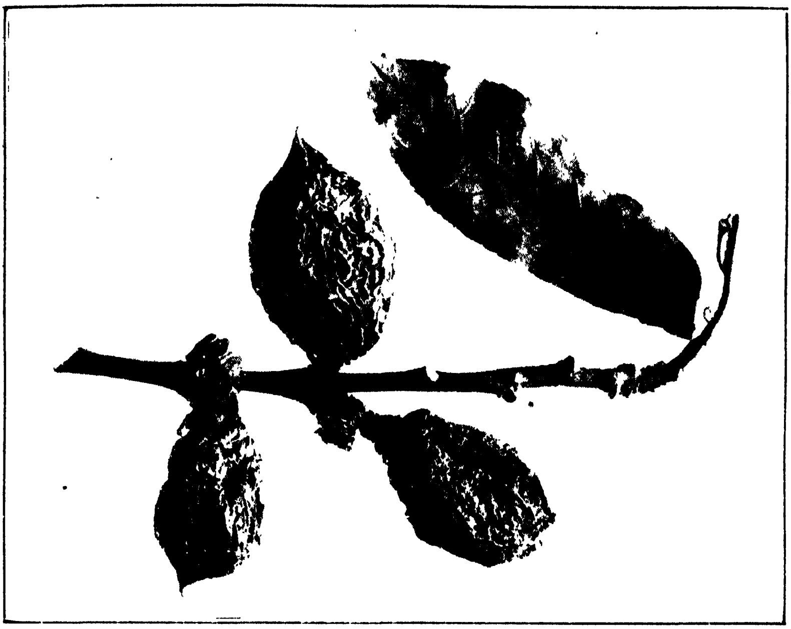


Fig. 1.—Nectarine fruit mummified as a result of Brown Rot attack.

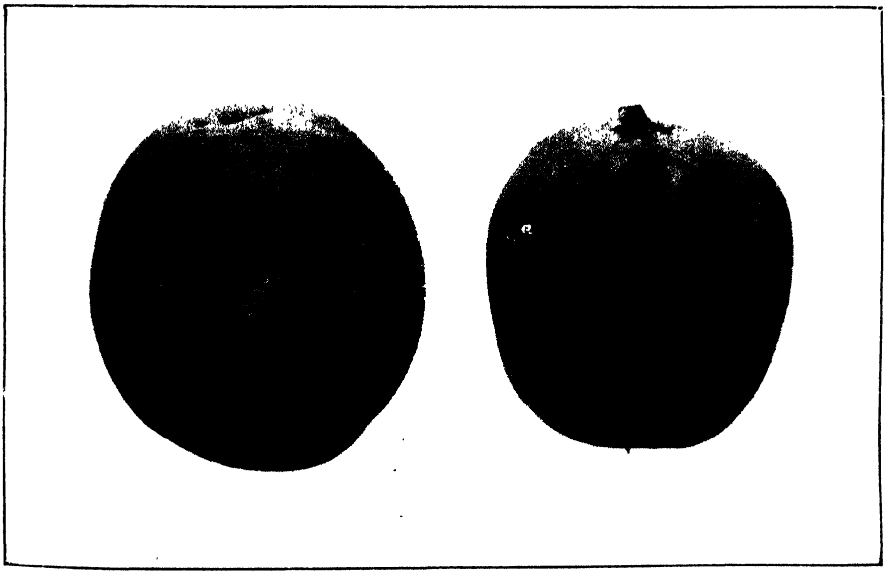


Fig. 2.—Brown Rot of Nectarine. In the fruit on the right infection has originated in a bruise.

Plate 10.

Black Mould Rot of Stone Fruits.

Black mould rot is a storage trouble sometimes confused with the true brown rot. It has been found affecting more especially peaches and plums, and in connection with these varieties has in some seasons been responsible for even more loss than brown rot.

SYMPTOMS AND CAUSE.

This rot commences as a small brown spot on the surface of the fruit, and in its early stages is indistinguishable from brown rot. Later, instead of the small compact powdery spore masses characteristic of this latter disease, there arise long delicate greyish-white threads of mould growth, which radiate out from the affected region (Plate 9, fig. 2). This mould growth belongs to the fungus (*Rhizopus nigricans*) causing the disease. A single mould "plant" possesses a number of root-like branched threads which ramify amongst the tissue of the fruit, which they destroy and so cause the brown rot. From the point of origin of these root-like processes there is given off a number of long slender aerial threads which are the spore-bearing structures or sporangiophores. These swell at the apex to form a globular sac or sporangium. Within the sporangium the protoplasm divides up into a great number of minute rounded spores which are finally liberated by rupture of the sporangium wall. The sporangia are at first white but as the spores mature they turn dark grey to almost black, and, being just visible to the naked eye, give a grey speckled appearance to the mould growth covering the fruit. Beside the spore-bearing hyphæ there is given off from each fungal "plant" one or more long slender threads or stolons, which grow out over the surface of the fruit until it in its turn becomes attached at some point and develops root-like processes which may penetrate the as yet uninjured skin and so commence a new point of rot.

The original infection of the fruit by means of spores appears to take place very largely if not entirely per medium of injuries to the skin, often very slight, in the form of scratches, bruises, &c. Once a point of infection has been created the mould quickly spreads by means of the stolons over the fruit and from there to the as yet sound ones adjoining. Under suitable conditions a day or two may suffice for the formation of large "nests" of rotten fruit bound together by the abundant grey mould growth commonly called "whiskers." Half a case or more may be involved in one of these nests. It is the rapid spread through a case which enables this mould when present to be responsible for greater loss on the market than brown rot.

CONTROL.

Since wounds appear necessary for the introduction of black mould, and the disease is one of stored fruit, control measures will have to be along similar lines to those found useful in connection with blue mould of citrus.

1. Avoid picking and packing during showery weather and when the fruit is wet. A marked increase of this rot has been noticed during periods of wet weather.

2. Take special care during picking and packing operations to see that the fruit receives no unnecessary injury. Finger-nail scratches and case bruises may be a source of trouble. All fruit showing injury or blemish should be rejected.

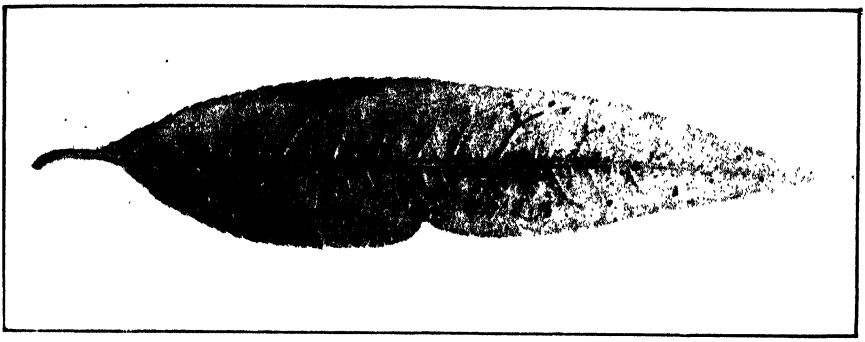


Fig. 1.—Peach leaf showing the sori formed by the Rust fungus (*Puccinia prunispinosa*).

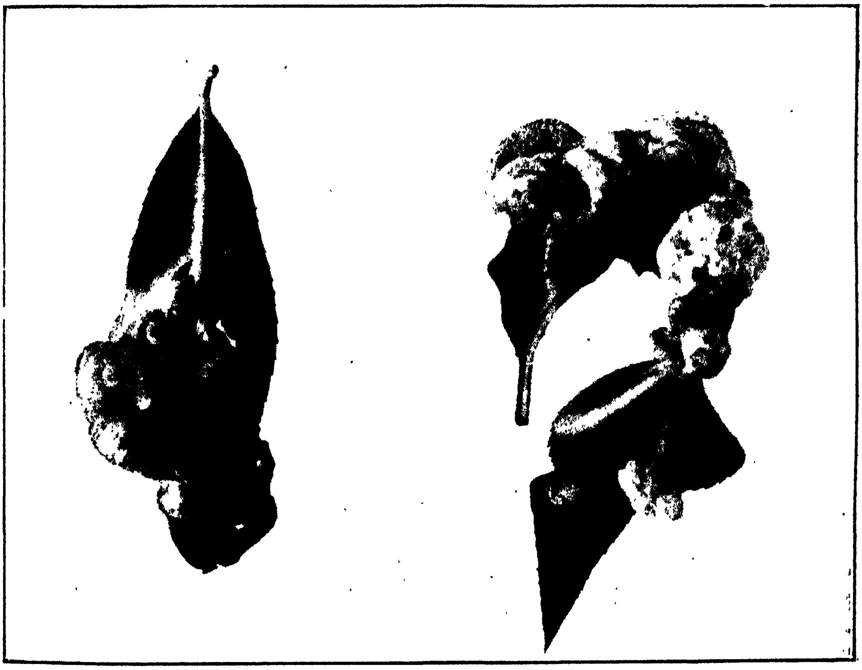


Fig. 2.—Peach leaves exhibiting the malformation characteristic of Leaf Curl

PLATE 11.

3. Cleanliness in the orchard and packing house is essential. All rotting fruit should be collected at frequent intervals and destroyed by fire or burying.

4. If the quality of the fruit is such as to make wrapping a justifiable outlay, this procedure would greatly reduce the loss by localising the attack to the originally infected fruit.

Peach-leaf Curl.

Leaf curl is a disease affecting chiefly the peach and nectarine, other varieties of stone fruits being rarely attacked. Like rust, this disease is widely distributed throughout the peach-growing centres of the world. Fortunately it is one of the plant maladies most easily controlled.

SYMPTOMS.

Leaves, young shoots, and fruit may be attacked, but the most common and characteristic symptoms appear on the first-mentioned. Affected leaves as they issue from the bud appear of a somewhat yellow or pinkish colour, and on expanding become all or in part curled and puckered (Plate 11, fig. 2). The deformed portions are considerably thicker than the normal leaf, and retain their unnatural coloration for some time. Later this is masked by the development of a grey bloom due to the formation of a layer of the fruiting bodies of the fungus causing the disease over the upper surface.

Finally the leaf turns brown and falls off. If the original infection was heavy the defoliation may be extensive. A new set of leaves is usually formed from dormant buds, but these may be developed too late to mature the fruit and next season's bearing wood. Repeated defoliation lowers the vitality of the tree and may eventually lead to death.

CAUSE.

Leaf curl is induced by a fungus parasite (*Taphrina deformans*), which is one of the more simple type of sac fungi or Ascomycetes. The presence of the mycelial threads of this fungus within the tissue of the leaf stimulates the latter to abnormal growth both in size and number of its constituent cells. This enlargement takes place mostly on the upper side of the leaf, with the result that the leaf becomes puckered and curled as described above. Later the fungus grows out between the epidermal cells and forms on the surface a layer of close, erect, oblong cells known as asci. Each of these contains eight rounded spores known from their method of formation as ascospores. They are liberated by rupture of the enclosing sac.

Some of the ascospores fall into sheltered situations where they are able to pass the winter, to germinate the following spring and infect the developing buds. Cool, moist weather when the buds are swelling provides conditions very suitable to leaf curl attack.

CONTROL.

This disease can be effectually checked by the application of a fungicide before the buds begin to swell in the spring. For this purpose Bordeaux mixture (6-4-40) or lime sulphur 1 in 10 may be used.

THE UPPER BURNETT AND CALLIDE VALLEY.

A NEW AND FERTILE AGRICULTURAL AND GRAZING REGION.

The subjoined notes are taken from a Report by the Land Administration Board on an economic investigation of the Upper Burnett and Callide Valley Land Settlement Scheme. This settlement scheme is, according to the Report, the most ambitious land settlement project in Queensland's history and, as originally conceived, was intended to provide farms for some thousands of settlers who would engage in mixed farming. The Board felt the need of carefully investigating the whole project to make sure that the foundations of the settlement were soundly laid before releasing more land for selection. The Report is a very complete and valuable one, and these brief extracts from it will be read with interest.

We are also indebted to the Land Administration Board for its permission to reproduce the very fine series of plates with which the Report is illustrated.—Ed.

History of the Settlement.

The Upper Burnett and Callide Valley lands extend from near Eidsvold on the south to near Rannes on the north, a distance of about 120 miles, and have an average width of about 40 miles. Although termed a "Valley," the area has an elevation varying from 800 to 1,700 feet. The country embraces all classes of land from rich agricultural soils contained in many of the creek flats to third class grazing land, comprising coarsely grassed mountainous country. The average rainfall is about 29 inches.

The classification of the land made by Staff Surveyors, before the settlement scheme was commenced, was as follows:—

	AGRICULTURAL.		GRAZING.	
	First Class.	Second Class.	First Class.	Second Class.
	Acres.	Acres.	Acres.	Acres.
Northern Burnett	186,000	400,000	498,000	336,000
Callide	104,000	391,000	90,000	488,000
Totals	290,000	791,000	588,000	824,000
Grand Total	2,493,000 acres.			

Much of the land classified as first class "grazing" land is eminently suited for dairying, as it contains many rich arable pockets. There are considerable belts of softwood and brigalow scrubs. Altogether the area may be regarded as very well adapted for a successful closer settlement scheme.

Before the advent of the settlement scheme the lands comprised in the Upper Burnett and Callide Valley were used almost solely for grazing and were mostly in the occupation of grazing selectors and pastoral lessees. Eventually Parliament authorised the extension of all three of these railways to converge on Monto, a new township in the centre of the area.

Monto lies 103 miles from Gladstone, 179 miles from Maryborough, and 172 miles from Rockhampton. Of the three railways, that connecting with Gladstone, although the shortest, was the most costly and difficult to construct, owing to the mountainous country (the Dawes Range) through which it passes. This railway has been completed to Dalkiel, and is at present under construction to Waratah, eight miles north-east of Monto. The Maryborough-Mundubbera extension is completed and open to traffic to Monto. The Rockhampton-Rannes extension is open to Thangool—63 miles north of Monto. Rails have been laid for a few miles beyond this point, and earthwork constructed still further to Mount Lookerbie, but all work has been discontinued.

PLATE 12.—THE MAIN STREET, MUNDUBBERA, 1914.

PLATE 13.—MUNDUBBERA TO-DAY.

What Mundubbera has done, several centres throughout the Upper Burnett and Callide Valley may do better.

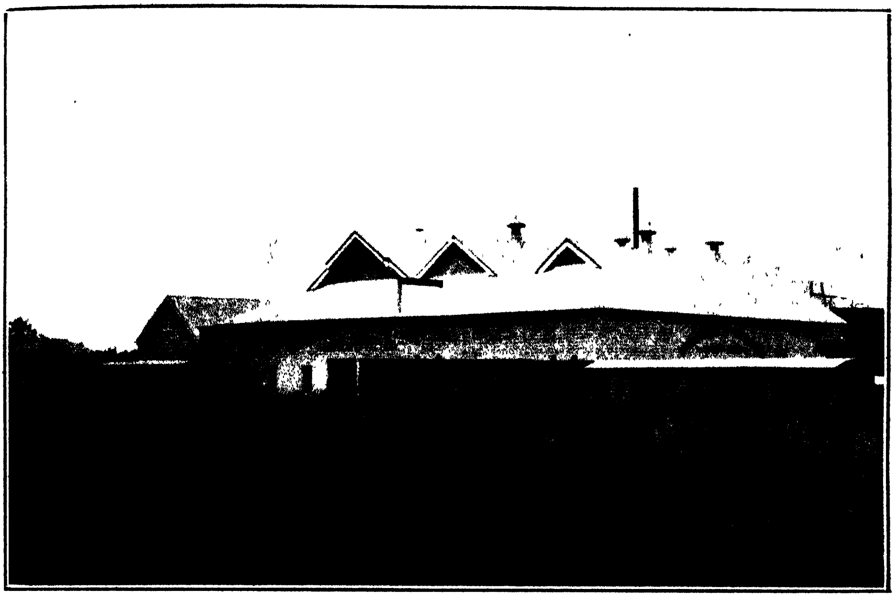


Plate 14.—Mundubbera Butter Factory.

Successful land settlement and industrial progress are closely allied.

Plate 15.—Site of Monto, 1924, at the Commencement of Settlement.

Railways, Roads, and Bridges.

As part of the settlement scheme, the Department of Public Lands undertook to construct, free of cost to the Local Authorities, the necessary roads and bridges to give pioneer access to each holding. This work was commenced in 1923 and is still proceeding. After construction, the roads and bridges are handed over to the Local Authorities, who are responsible for their future maintenance.

In the early days of this work the Department did not possess adequate machinery, and many of the roads were indifferently formed. The present standard of work, which is done with the aid of modern plant, is, however, quite satisfactory, and settlers are being provided with reasonably good roads. The bridges throughout the area, constructed by the Lands Department, are first class structures.

Altogether 634 miles of road and five bridges and causeways have been constructed.

New railways were needed in order to open up this land. Without railway communication the Upper Burnett could not have been used for any industry other than grazing, and closer settlement would have been out of the question. For years prior to Parliament authorising the building of the railways, there had been great rivalry between Rockhampton, Gladstone, and Maryborough as to which branch railway should be extended to the country. Each centre was anxious to obtain the trade that was certain to flow from this rich area, and railways from each centre had already been constructed to the fringe of the proposed settlement. Existing railways reached from Rockhampton to Rannes, on the north, from Gladstone to Many Peaks on the east, and from Maryborough to Mundubbera on the south of the area.

Water Supply.

Expenditure by the Government has also been incurred in the provision of water facilities for settlers and in advances by the Agricultural Bank for the assistance of settlers. Both these matters are referred to in detail in the Report.

This expenditure, however, stands in quite a different category to the other expenditure on the settlement. In each instance the money advanced is in the nature of a loan to the settler, and ordinarily should be repaid by him with interest over a period of years.

The Report incidentally makes clear that modern settlement schemes are costly undertakings. If railways have to be pushed out ahead of settlement, if roads and bridges have to be constructed, and other Governmental aid granted to settlers, the burden of all this expenditure must, until the new settlement becomes productive, be carried by the general community.

Land Settlement—Old and New Systems.

The large expenditure that has been incurred illustrates, in a striking way, the difference between old and new settlement schemes.

In the early days of settlement a family would settle on the land, produce almost all its own requirements, and earn in actual money a very small income, which would be expended on articles which the farm could not produce. To live, rather than to earn or produce for the use of others, was the dominating purpose. Now all this has changed. The modern view is that, unless the income received from the products of the farm can approximate the money that would be earned from similar energies elsewhere, there is no inducement to settle on the land.

In former days communities established themselves by years of arduous pioneering work with little outside assistance, and railways were provided only after the settlers had demonstrated the wealth productivity of their lands, and their capacity to provide the railways with considerable business. Now the position is reversed; public expenditure goes first and settlement follows. Such public expenditure must necessarily be unproductive for a few years.

In dealing with settlement schemes the British Economic Mission, in its Report dated 7th January, 1929 (page 6), pointed out that such schemes, financed out of loan moneys, should be self supporting within a reasonable measure of time. The members of the Mission went on to say, "By this we mean that within such measure of time they should, either directly, or indirectly through the increased taxable capacity of the community and the enhanced value and price of Government-owned land attributable to the development schemes, provide at least their own working costs, interest on the loan capital invested in them, and a sinking fund sufficient to provide for its repayment when it falls due." Judged on that basis, the Upper Burnett and Callide Valley Settlement Scheme may be regarded as a sound State investment.

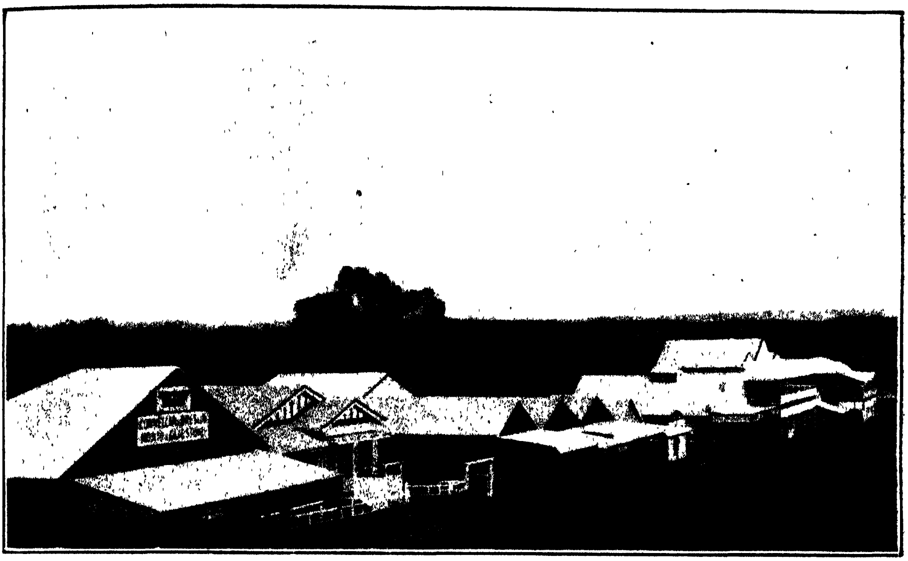


PLATE 16.—THE MAIN STREET, MONTO, TO-DAY.

Less than five years old, Monto is a rising township, in picturesque country in the heart of the Upper Burnett. Surrounded by good dairying and agricultural land, Monto is destined to become the capital of the Upper Burnett and a country township of considerable importance.

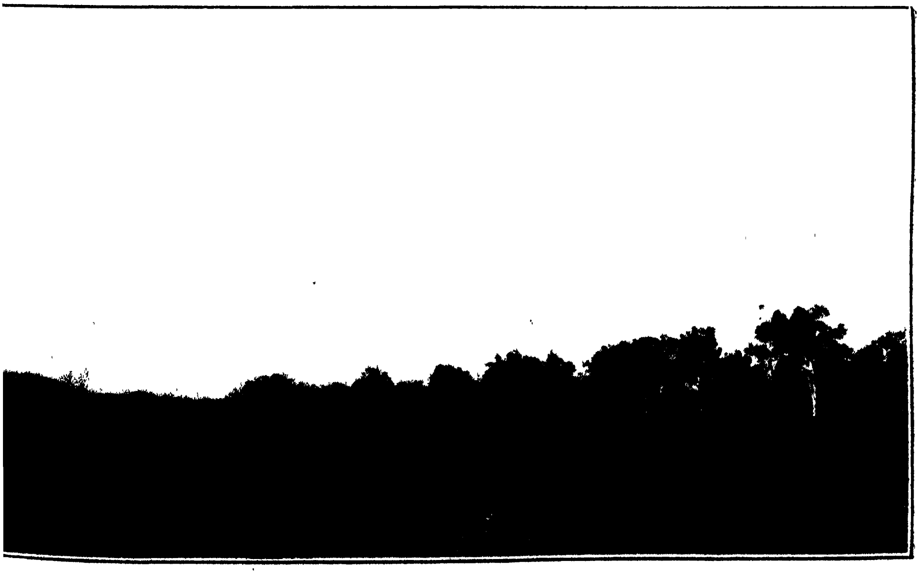


PLATE 17.—A FIELD OF COTTON, WARATAH, UPPER BURNETT.

PLATE 18.—"KERWEE," A FARM HOME ON THE UPPER BURNETT SETTLEMENT.

PLATE 19.—THE START OF A NEW TOWNSHIP ON THE MANY PEAKS-MONTO LINE, 13 MILES NORTH-EAST FROM MONTO.

The first building to be erected was the railway station-master's house.

When fully settled on the lines of the Board's recommendations, it is estimated that the settlement will comprise 1,500 mixed farmers, dairymen, and graziers, and the annual production from the settlement will then probably exceed in value one million pounds sterling. All the State expenditure, therefore, that has been incurred in the scheme must be considered in relation to the many advantages to the community of this increased annual production. But there is another and still more important way in which the matter may be measured—in persons rather than in money. Amongst the settlers many are to be found with large families. A number of the witnesses who gave evidence before the Board had families ranging from six to ten children. Allowing, however, for average families of three children, the Upper Burnett and Callide lands will directly support 7,500 people.

Now for every £1,000,000 of wealth produced from the land, it may be said, as a wide generalisation, that about one-third will find its way into the pockets of the producers, while two-thirds, as costs of production and general expenses, will be distributed amongst the community. Therefore, besides the 7,500 people maintained on the land, the distributed wealth will support a further 15,000 people, making 22,500 people all told. Such is the value of this settlement scheme to Queensland.

Much is heard from time to time of progressive settlement schemes in Western Australia. It is surprising how ready some people are to make comparisons to the detriment of Queensland, while lacking even elementary knowledge of the subject being dealt with. For the information of those who like comparisons the Board reproduces in Appendix A of the Report, an analysis of group settlements in Western Australia which appeared in the "London Times" of the 14th September last and which has since been verified.

Having discussed the matter in this general way, the Board proceeds to give particulars of its inquiry and to state in detail the conclusions it has reached regarding the future administration of the Upper Burnett and Callide Valley settlement.

Soil and Climate.

The opinion of the Board is that the Upper Burnett and Callide Valley lands are eminently adapted for a successful closer settlement scheme. The Report continues: Rich belts of country exist which bear comparison with anything to be found in other parts of Queensland, and, if closer settlement could not succeed on such an area, the outlook for increased primary production in Queensland would be dismal indeed. But it must be remembered that the country is, or a few years ago was, largely virgin land, and, therefore, many years of concentrated effort will be needed to put this settlement in the same developed and established condition as the older closer settled districts of the State, such as for instance the South Coast, the Brisbane Valley, or the Wondai-Kingaroy areas. The progress that has already been made, and the towns that have been established throughout the area, speak well for the energy and enterprise of the people, and, in the course of time, there is no reason to doubt that this great new district will compare favourably in prosperity with the other districts mentioned.

The climate of the settlement is invigorating and healthy. Sheltered from the humidity of the coast by the Burnett and Dawes Ranges, the winds that come in from the Pacific are dry and keen. The winters are not unduly severe. The average annual rainfall, taken from official records at places scattered throughout the area, is about 29 inches.

The Upper Burnett and Callide Valley are served by the Burnett River, and many large creeks. On the southern watershed there are Splinter, Three Moon, Monal, Boogolgopal, Cattle, Trevethan, Small's, and other creeks, and the Rawbelle or Nogo River. On the northern watershed the creeks are Grevillea, Kariboe, Kroombit, Callide, and Bell. These creeks drain an extensive area of country, and in heavy rains the water overflows the banks and inundates the adjacent flat country. In places there is a considerable current.

The years 1927 and 1928, and the early part of the current year, were exceptionally wet. In consequence floods were more severe than usual, and much damage was done on the rich alluvial flats adjacent to the creeks. In average years the great bulk of the rich agricultural land in the district may be cultivated without losses by flood.

Products, Markets, and Prices.

The land is capable of producing many and varied products such as different kinds of crops, cream, pigs, and fat stock. For the present cream and cotton are the principal products. The problems of marketing the products from the area are no different from the general problems of marketing which face all primary production in the State. They are not, therefore, specifically referred to in the

PLATE 20.—RINGBARKED RIDGES BETWEEN WARATAH AND KOLONGA, UPPER BURNETT.
Showing the extent of sweet grazing country.

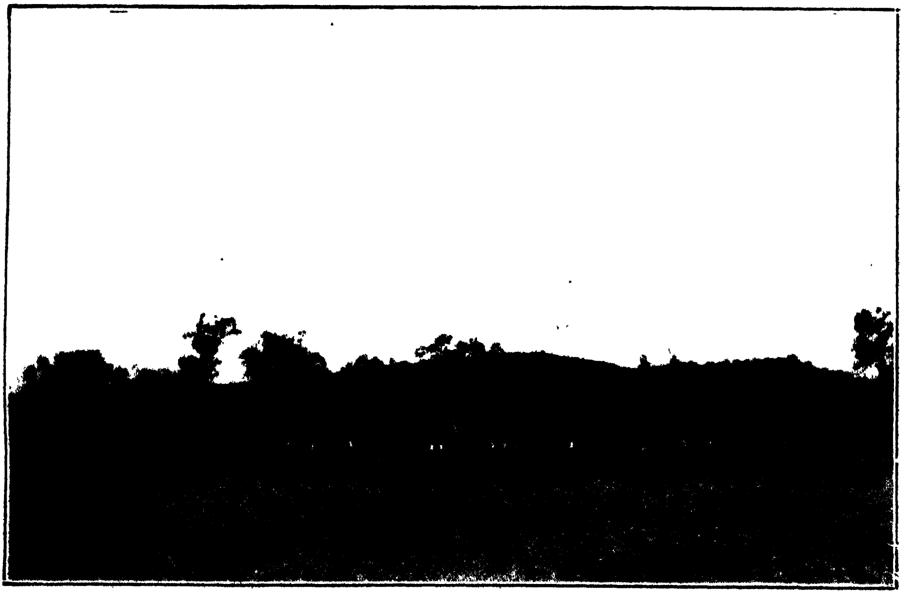


PLATE 21.—HEREFORD CATTLE HOOK-DEEP IN LUSH PASTURE, PARISH OF GREVILLEA, CALLIDE VALLEY.

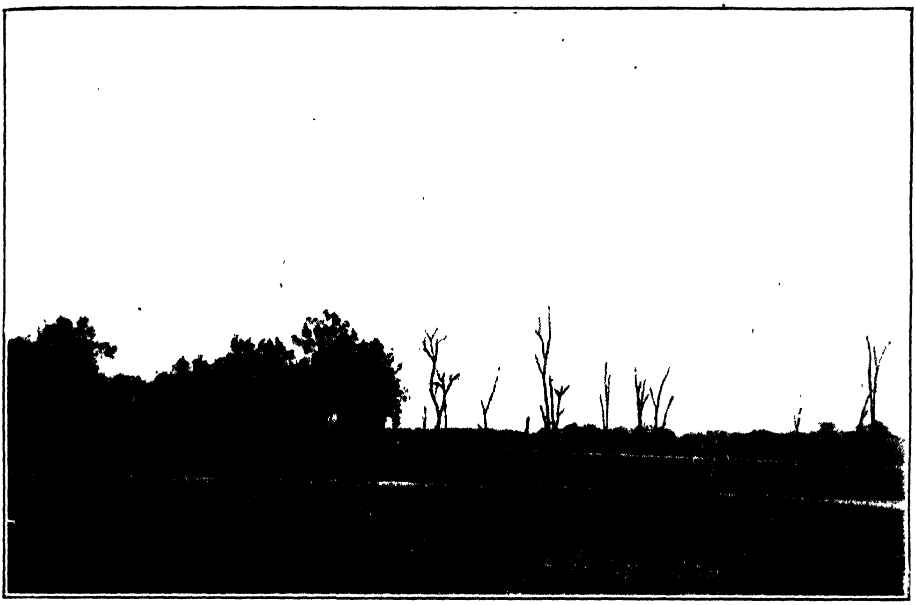


PLATE 22.—FIRST-CLASS CULTIVATION LAND, CANIA ROAD, UPPER BURNETT.

"Rich belts of country exist which bear comparison with anything to be found in other parts of Queensland, and, if closer settlement could not succeed in the Upper Burnett and Callide, the outlook for increased primary production in Queensland would be dismal indeed."

PLATE 23.—A WEALTH OF NATURAL GRASS, PARISH OF GREVILLEA (THIRD SECTION).

Report. The Upper Burnett and Callide Valley and neighbouring districts are specially suited for the production of cotton. In fact they are the chief cotton producing centres of Queensland and Australia. What is the value of the cotton industry to Queensland, and is it worth establishing as an integral part of the life of the State? The Cotton Board answers this query with the following comment:—

> "Already this young industry is playing an important part in the life of the community. With the production of slightly over 12,000,000 lb. of seed cotton in the 1928 season, more than 4,000 pickers were employed, exclusive of family labour. The wages bill is a big one. The payment to the railways for transport charges was approximately £8,000. Further moneys have been paid in connection with the handling of lint for export, and the ginneries and oil mills of the British Australian Cotton Association employed during the season about 120 employees. In addition, this company pays away other large sums of money for cartage, handling, and shipping charges on cake and oil. In the face of these facts it is easy to visualise the very great influence for good which an extensive cotton industry would have on the community in general.
>
> "A quadrupling of the present crop is possible within a very short space of time. This increase in the crop, however, can only be brought about by sales of lint to Australian spinners. This would mean an additional annual income of £600,000. The effect of this increased wealth upon the relieving of unemployment and upon the important national questions of development and migration is difficult to measure.
>
> "If the industry is worth establishing, and this we contend is unquestionable, then due regard must be had to the fact that adequate assistance is necessary during the experimental stage. When one has regard to the fact that the American industry has been in existence 100 years, it is obvious that the Australian industry, which has only been in existence a few short years, has not yet emerged from the experimental stage."

For the Callide Valley the matter of the survival of the cotton industry is of great importance. The foundation of that district, much more so than the Upper Burnett, was based on the growing of cotton. Cotton originally attracted most of the settlers to the land. Cotton kept them going. Cotton established the towns of Biloela and Thangool. Cotton growing, as an industry, must surely and quickly decline unless means can be found to stabilise prices, and ensure a reasonable return to the grower.

Various proposals have been submitted to the Commonwealth Government by the Queensland Cotton Board and by cotton manufacturers to help the growing and manufacturing industries over the difficulties with which they are faced, due to competition from overseas. These proposals may be summarised as follows:—

(*a*) Duty on raw cotton and linters to be imposed so as to ensure the purchase of the Australian article by spinners.
(*b*) Deferred duty on cotton yarn to be made effective.
(*c*) Duty on cotton wadding and oils to be increased.
(*d*) Bounty to be given on percentage yarn.
(*e*) Bounty on cotton yarn to be increased.

The Commonwealth Tariff Board has inquired into these matters, and has reported thereon to the Commonwealth Government, which now has them under consideration.

General Administration.

Matters of general administration in regard to the settlement are discussed in the Report under the following main headings:—

(1) Sound Settlement Areas.
(2) Additional Areas for Settlers.
(3) Capital Values and Rents.
(4) Freehold Tenure *v.* Perpetual Lease.
(5) Water Facilities for Settlers.
(6) Roads and Bridges.
(7) Operations of the Agricultural Bank.
(8) Immigration Settlement.
(9) Prickly-pear Land.
(10) Departmental Organisation.

Altogether the Report is one of the most useful ever presented on land settlement in Queensland.

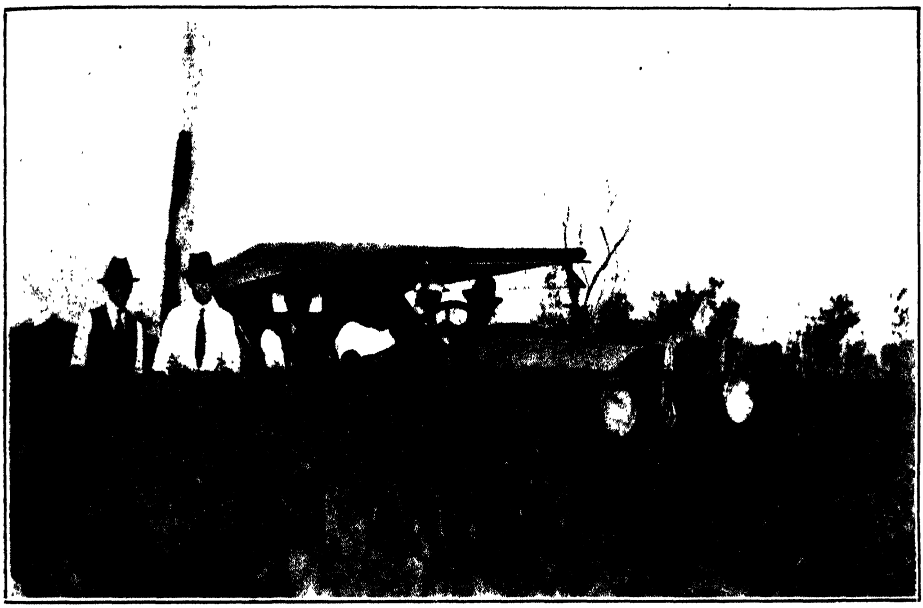


PLATE 24.—PASTURES THAT HAVE NEVER BEEN FURROWED (GROWTH OF NATURAL GRASS, CALLIDE VALLEY).

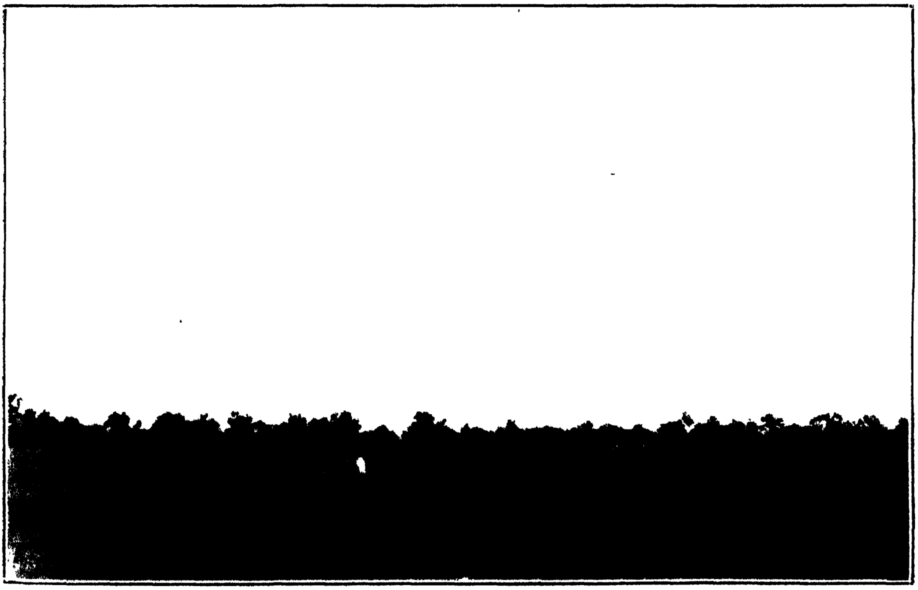


PLATE 25.—EXTENSIVE FLATS, PARISH OF GREVILLEA (THIRD SECTION).

The Third Section has not yet been made available for settlement.

"Judged on the basis laid down recently by the British Economic Mission, the Upper Burnett and Callide Valley Settlement Scheme may be regarded as a sound State investment. Indirectly, it will return interest and redemption manifold."

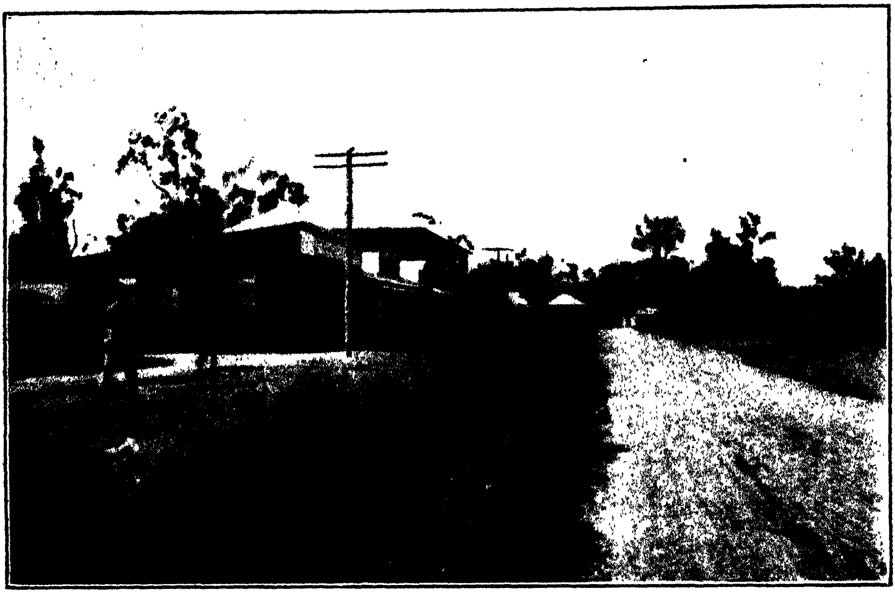


PLATE 26.—A PROSPEROUS TOWN IN THE MAKING (THE MAIN STREET, BILOELA).

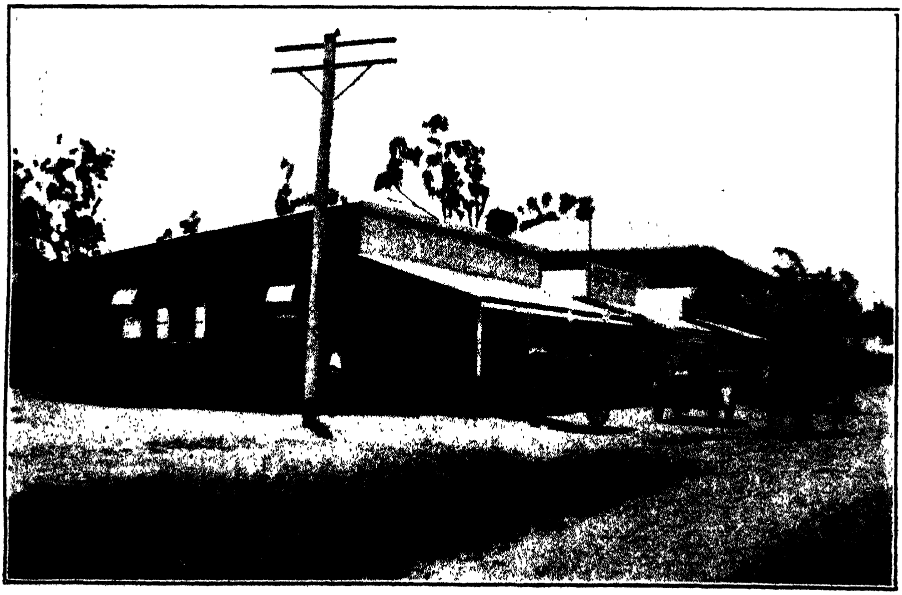


PLATE 27.—A BUSY CORNER OF THE MAIN STREET, BILOELA.

"The progress that has already been made, and the towns that have been established throughout the area, speak well for the energy and enterprise of the people, and, in the course of time, there is no reason to doubt that this great new district will compare favourably in prosperity with the older closer settled districts of the State."

PLATE 28.—BRIDGE OVER THREE-MOON CREEK, NEAR MONTO, UPPER BURNETT.

"With the advent of closer settlement entirely new roads had to be constructed to serve the new subdivisions and enable the settlers to get their products to the railway. New bridges, causeways, and crossings were also needed. Whereas, formerly, it was of little economic importance if a cattle grazier were isolated for a few weeks owing to the state of the roads and crossings, it is necessary under the altered settlement conditions that settlers should have daily, or almost daily, communication with the railway."

PLATE 29.—KROOMBIT CREEK BRIDGE UNDER CONSTRUCTION, CALLIDE VALLEY.

PLATE 30.—MACK'S CROSSING, MONAL CREEK, NEAR MONTO, UPPER BURNETT.

PLATE 31.—ROAD THROUGH SCRUB COUNTRY NEAR THANGOOL, CALLIDE VALLEY.

"As part of the settlement scheme, the Department undertook to construct, free of cost to the Local Authorities, the necessary roads and bridges to give pioneer access to each holding. The present standard of work which is done with the aid of modern plant is quite satisfactory, and settlers are being provided with reasonably good roads. The bridges throughout the area, constructed by the Lands Department, are first-class structures."

PLATE 32.—SECTION OF ROAD BETWEEN MONTO AND SPLINTER CREEK, UPPER BURNETT.

PLATE 33.—ANOTHER VIEW OF THE ROAD FROM MONTO TO SPLINTER CREEK, UPPER BURNETT.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF MAY IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING MAY, 1929, AND 1928, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	May.	No. of Years' Records.	May, 1929.	May, 1928.
North Coast.	In.		In.	In.
Atherton	1·91	28	1·29	1·03
Cairns	4·37	47	1·96	2·38
Cardwell	3·48	57	1·61	1·74
Cooktown	2·88	53	0·76	0·62
Herberton	1·59	42	0·81	0·54
Ingham	3·31	37	0·76	1·17
Innisfail	12·22	48	3·77	9·07
Mossman	3·38	16	2·36	1·37
Townsville	1·28	58	0	0
Central Coast.				
Ayr	1·08	42	0	0
Bowen	1·26	58	0	0
Charters Towers ..	0·75	47	0	0
Mackay	3·73	58	0·34	2·43
Proserpine	4·34	26	1·06	1·23
St. Lawrence.. ..	1·74	58	0	0·19
South Coast.				
Biggenden	1·76	30	0	1·71
Bundaberg	2·66	46	0·31	0·86
Brisbane	2·77	78	0·42	1·82
Caboolture	2·82	42	0·47	1·67
Childers	2·15	34	0·22	0·98
Crohamhurst ..	4·86	35	0·89	4·12
Esk	1·98	42	0·14	2·19
Gayndah	1·52	58	0	0·09
Gympie	2·90	59	0·12	2·14
Kilkivan	1·84	50	0	0·82
Maryborough ..	3·10	57	0·25	1·16
South Coast—continued :				
Nambour	4·81	33	0·72	2·97
Nanango	1·50	47	0	0·94
Rockhampton ..	1·43	42	0	0·11
Woodford	2·87	42	0·44	2·57
Darling Downs.				
Dalby	1·31	59	0·12	0·88
Emu Vale	1·12	33	0·31	0·64
Jimbour	1·20	41	0·03	1·43
Miles	1·49	44	0	0·74
Stanthorpe	1·87	56	0·23	1·38
Toowoomba ..	2·17	57	0·05	1·79
Warwick	1·54	64	0·09	0·95
Maranoa.				
Roma .. .	1·43	55	0	0·40
State Farms, &c.				
Bungeworgorai ..	0·83	14	0	0·42
Gatton College ..	1·60	29	0·07	1·36
Gindie	0·92	29	0	0·00
Hermitage	1·18	22	0·09	0·65
Kairi	1·77	14	0·50	1·52
Mackay Sugar Experiment Station ..	3·28	31	0·35	2·03
Warren	0·89	14	0	..

GEORGE G. BOND,
Divisional Meteorologist.

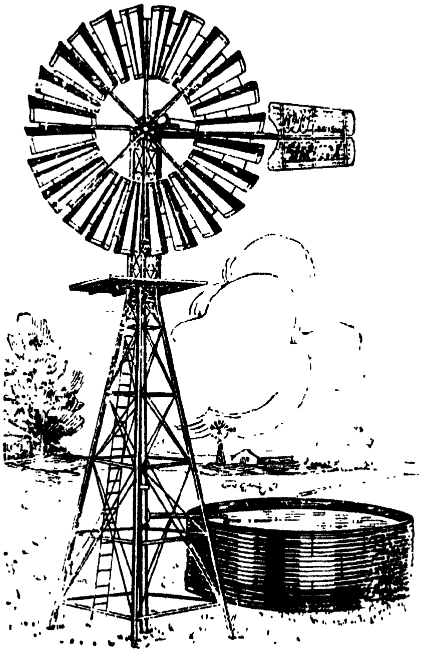
14th June, 1929.

QUEENSLAND SHOW DATES, 1929.

Townsville: 9th to 11th July.
Woodford: 11th and 12th July.
Home Hill: 12th and 13th July.
Samford: Postponed.
Woombye: 12th and 13th July.
Charters Towers: 17th and 18th July.
Ingham: 19th and 20th July.
Caboolture: 18th and 19th July.
Rosewood: 19th and 20th July.
Ithaca: 20th July.
Laidley: 24th and 25th July.
Nambour: 24th and 25th July.
Ayr: 26th and 27th July.
Barcaldine: 30th and 31st July.
Maleny: 31st July and 1st August.
Bowen: 31st July and 1st August.
Nundah: 3rd August.
Redcliffe: 9th and 10th August.
Royal National: 12th to 17th August.
Crow's Nest: 21st and 22nd August.
Wynnum: 30th and 31st August.
Goombungee: 30th August.
Imbil: 4th and 5th September.
Zillmere: 7th September.
Stephens: 14th September.
Malanda: 18th and 19th September.
Pomona: 18th and 19th September.
Beenleigh: 20th and 21st September.
Rocklea: 28th September.
Kenilworth: 28th September.
Enoggera: 5th October.
Pine Rivers: 15th and 16th November.

The ACME OF PERFECTION

SIMPLEX
WINDMILLS



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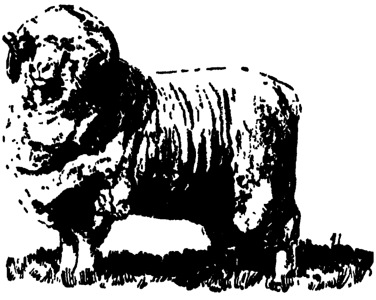

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CATTLE BREEDING AND MANAGEMENT.

By H. ANNING, Wetherby, via Richmond, Queensland.*

The question of what kind of property to buy is naturally the most important one. The most necessary requirement is good, well-watered country, and how to distinguish good country from bad often puzzles experienced men. It is advisable to shy off country which gets too big a rainfall, as grass is rank and sour there as a rule. Swampy country is bad, as it is a breeding-ground for ticks. It is best to inspect in the off season, say, in August or September, before the storms have started. If cattle are in fair condition then, and appear to be able to hang on for three or four months before losses commence, the country should be all right.

On good country cattle run in big mobs; that is always something to go on. On poor country they split up into twos and threes, and look like kangaroo dogs. Those on the main frontages and camps tell the most eloquent tale. Outside cattle are always in good condition, because they have the country all to themselves. Algy should take particular notice, when riding along the main creeks, of the condition of cattle fringing the big waterholes. The old cows, with young calves at foot, will naturally look the worst. If they are in fair, strong condition, and calves appear well nourished, the rest may be taken for granted. If he be an observant young man, that is the time to pick the camps, because it is the time of year that cattle come in regularly and early, and spend a great part of the day on the camps they choose for themselves.

Coastal country is often good, if the creeks run up to rangy country. Being well drained, they often open out into deep valleys, with little pockets in the ranges composed of black soil plains and flats. These sometimes grow a little Flinders grass, and a rough, course species of Mitchell. Unfortunately—as is generally the case—the further away one gets from the coast the lighter the rainfall. Country gets sweeter, but water gets scarce, and it doesn't pay to have to pump water for cattle —yet. Of course, that kind of country is all right for the early part of the season, but cattle must be shifted when it gets dry. There is any quantity of beautiful downs country to be had for a song, but all the water must be obtained by boring, and raised by windmills and engines, and this does not pay, especially when the cost of boring and equipment is heavy. It is better to put up with inferior country, where the seasons are more reliable and Nature attends to the watering.

The Outback Station.

The question of locality must be carefully considered. If right away out "where the tall gum trees grow, &c.," rents will be low, probably not more than 2s. 6d. per mile. Everything in the nature of stores, saddlery, fencing wire, will be at famine prices. Road carriage will be fearfully high likewise, and most unreliable. The cost of regular drafts of bulls will be something to remember with a shudder. However, as aforesaid, there are compensations. Labour will be cheap and plentiful. A squatter can rent 2,000 square miles of country, and make use of 10,000 if he wants it. There are no rates or taxes, and this is something to be thankful for. A lot can be done with greenhide, which takes the place of leather. Men in those far-out localities are very self-reliant and resourceful. They do all their own saddle repairs, make pack saddles and bags out of greenhide, and look after what they have made very carefully. Hopples and ropes, of course, are made out of the same material.

Salt can be gathered and bagged in hundreds of tons from salt water arms, after high tides have receded and the water evaporated. The salt—though not as good as the refined article—is quite good enough, and most useful to put out for the cattle on the different camps. Some people nail hides around trees, with the fleshy side outwards and the hairy in, and after filling them with salt, nail the upper portions into the trees above. Rain causes the salt to work through the hide, and cattle come on to the camps and lick it. Finally, they tear the hides away to get at the salt. Where salt is plentiful, however, it is best to give the cattle all they want in big troughs. There is nothing better to break cattle into camps, I consider, although I know some good cattlemen condemn it.

The Heads of the Herd.

The greatest drawback to outback stations is, of course, the trouble and expense of getting bulls up when needed. It doesn't pay to get small annual drafts. One way of getting over this is to buy some pure-blooded bulls, and start a small stud. Good cattlemen have tried this and come to grief, but I knew one man who made a brilliant success of it. He used to buy first-class bulls, giving up to 200 guineas for them. Then he paid a fancy price to the owner of some good herd to allow him to go right through the herd and pick 200 to 300 heifers. After their calves had been branded and culled, he used to go through the young bulls at twelve months old, and cull out anything again which wasn't developing as he liked. Eventually he used to keep about 60 per cent. of the male drop as bulls, and put these into the herd at two years old. The rest he shot. The heifers he sold. He never bred from the progeny. Every few years he disposed of what was left of the stud, and started up again an entirely fresh lot. In this way he avoided inbreeding.

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* In the "Pastoral Review" for April and May.

He was most particular about constitution, ruthlessly sacrificing anything savouring of the slightest weakness. He had a decent herd, and a definite type of bullock, suitable to the country, was produced. Of course, the knife was used freely on the station breeders as well. This method saves a lot of expense, but it requires an experienced man to carry it out properly, and Algy would perhaps be well advised to spend more and get his bulls from some good stud.

It may be assumed that after several inspections Algy is eventually suited with a property. Suppose he purchases, pays a deposit, and makes arrangements to take delivery by means of a bang tail muster, to commence as soon as the wet season is over. Then he is all set, and is about to see something which will remain in his memory for many years to come. There are two advantages in buying by bang tail muster. A man only pays for what are delivered, and he also has an opportunity of classifying his herd as they run through the yards, and the opportunity should not be missed.

Of course, the herd is badly knocked about on an unfenced run. Cattle are driven long distances, and the same cattle are driven and handled over and over again, but once it is over they can be given a good spell, and if the new owner is lucky enough to get rain they soon recover. Buying on the ''walk-in-walk-out'' principle is not to be recommended, since numbers are often over-estimated (by the vendors), and it is best to be quite sure of what one is purchasing.

The Business Side.

There are about 12,000,000 cattle in Australia (or rather there were in 1926). . . In the Northern Territory, most parts of Queensland, and the northern portion of Western Australia the cattle game hasn't paid since 1921. It used to cost about 30s. a head to breed and fatten a bullock in the old days. Now it costs about £6 10s. In ancient times squatters were glad to get £2 10s. for a big fat bullock, and good careful managers made fair incomes then. £1,000 a year was considered a princely income in those days. To-day fat beef is worth 24s. per 100 lb. or thereabouts at northern works. Droving and trucking have to come out of that, and this costs about 30s. per head for bullocks fattened in the Gulf, so that there is no margin for profit yet. Fat beef must rise to 30s. per 100 locally before cattlemen can reckon on a fair profit. The man with 10,000 cattle can then reckon on an income of some £2,000 a year.

Unfortunately herds have depreciated so much in numbers and quality, owing to the lack of markets, rounded off with the horrible drought, that future profits will be largely eaten up in payments of interest and restocking. When cattle do really rise to a good payable price—say, £2 per 100 lb.—most of the existing owners will jump at the chance to sell out, just as they did after the long depression prior to and in the terrible drought of 1902. People buying in now will reap the benefit. All indications point to a good market in the future, and when the tide turns, old-timers will be foolish to sacrifice their holdings.

Getting a Bit o' Country.

In the case of any young man wishing to invest, he must choose between a large area of country, out beyond the rim, with a big neglected herd (probably), or a nice compact little property in a nice district handy to the rail, a well-broken-in herd of good cattle, and, generally speaking, every comfort and convenience. He can estimate to a penny almost what he can make out of such a place, but, of course, there is no chance of expansion. A young man, with a strong constitution, plenty of pluck, determination, and perseverance, I should advise to get well out, and buy a large herd, even if it is badly neglected, and overrun with rowdy bullocks.

Of course, it is advisable to get decent country, well watered naturally. The advantages of buying this way are, that first the place can be bought cheaply, and it is quite possible to resurrect any herd. Labour will be cheap, since abo. stockmen will be plentiful, and, properly and tactfully worked, they are real good men. I will admit they are hard to understand and work, and one must put up with a lot, but in open unfenced country they are indispensable in some respects. Tracking is to them something so natural that they cannot understand anyone not being able to read, interpret, and follow tracts. Of course, the disadvantages of such a property are obvious enough. Markets will be far distant, but the extra cost of droving is compensated for by the lessened cost of breeding and fattening, while one does not suffer to the same extent from droughts. Apart from all other considerations, a few years spent by a young man under the conditions outlined do him a lot of good, and the experience is a most interesting one to look back upon. If the young man is a novice, it will, of course, pay him to get a good head stockman, and the type to avoid like poison is the "galloping musterer."

The Rowdy Herd.

Now assume he purchases a piece of country, with a herd of 15,000 cattle. There are no fences, and few yards or other improvements. The cattle have been worked on no particular plan or sytsem. Sometimes they are worked up the creek, other times down, and always rounded up on different camps to be cut out. Naturally the poor unfortunate creatures look on man as their natural enemy, and it takes a lot of hard galloping and swearing to steady a mob after it has been sighted. Often they are not sighted; the cattle hearing them come start off at full gallop, and stockmen must race along the tracks to come up with them.

Hereinafter the buyer will be called Algy for short. Algy's first objective is to steady the cattle, break them properly into camp, and always work them the same way. The work of transforming that herd into a quiet one is not going to be done in a day. By going carefully and systematically to work it can be done thoroughly in about five years.

A First Essential.

In all probability Algy will discover there are two main branding yards, about 40 miles or so apart, and a few broken-down tailing yards. The cattle have always been driven great distances to get to a yard. One of the first essentials is to build a chain of tailing yards and small branding yards, and alongside the latter build paddocks, about two miles square, with three strong barbed wires to hold weaners. The branding yards can be built for £100. The tailing yards are best built of posts, three barbed wires, and a top rail. They should be large, say 100 yards square, and placed on soft sites, with some shade trees enclosed. This gives the cattle plenty of room to spread out and lie down.

Branding yards should be built on main creeks, about 15 miles apart. Wherever there is a good permanent waterhole, a soft shady camp on the bank of the creek, and good grass a little way out on both sides, that is a good place to form a camp, build a branding yard, and small paddock. Branding yards should be strong, and built to a proper plan, so that cattle will run well. I have seen a lot of money spent on yards in which cattle had to be badly knocked about to draft, and others in which they ran through like quicksilver. Yards had best be planned by old experienced cattlemen, since a panel too many in a lane makes all the difference to cattle running freely; also the yard should be planned so that cattle work back towards their feeding ground. A chain of substantial yards built along the main creeks and camps need not cost a great deal, and they are indispensable.

Choosing Camps.

The question of choosing camps is most important, since once picked the camp should never be changed. It should be soft, well shaded, and with a good open "face." Superfluous trees can be cut down and burnt. It should be big enough to hold from 1,200, to 1,500 cattle; it is not advisable to put on more cattle than that at once. Another little patch of trees, close handy, does to put "the cut."

Now that is the camp, and it is chosen chiefly because cattle have already demonstrated their affection for it. It is a good thing to buy a few tons of rock salt, and always have some on the camp, especially just before a muster. That increases the attraction. In time to come cattle will make naturally for the camp as soon as they are started up, and take very little holding while cutting out goes on. All this makes ultimately for economical and efficient working. Also, as already pointed out, they get contented and quiet, and cease to regard man as their natural enemy.

The sooner camps are picked, yards built, and the work of breaking cattle in commences, the better. The first year very little improvement can be expected, and Algy will find mustering to be hard uphill work, but assuming that 4,000 weaners have been taken from their mothers before the end of the season and herded in four separate mobs for a month or five weeks by men understanding their work, those weaners will remember the experience, and help instruct the older cattle. They themselves will be no trouble to work the following year, and as bullocks will be good on the road. Weaning regularly and herding soon tells a tale.

THE MAKING OF A CAMP HORSE.

By "CULKAH."*

What a big part in the busy cattle man's life the camp horse plays! Yet he or she (because many mares are just as smart and brainy as t'other) are to-day treated in a fashion that must make the old-time camp rider turn in his grave.

Years agone the camp horse held pride of place, was led to the cattle camp, did his arduous work, got a rub down, and was let go. Not from him or her was the extra work of yarding asked. Moreover, those brainy equine workers knew well what was their legitimate job, and objected, in some instances very plainly, to what they considered extra work, or work that was really quite beneath their dignity.

Yea, camp horse knew his worth, and the old riders knew his worth, therefore some wonder horses lived in the year gone past.

As a brainy boxer will conserve his strength through a gruelling mill, so will the rider and horse that know one another and are on intimate terms see a lot of work put through with minimum effort. Times out of number both horse and rider seize the psychological moment and bluff a beast out before it knows where it is. For the love of Mike don't harass a beast more than is necessary. Give it a chance to see there are other cattle out to bear it company. But we're a bit ahead of the job.

Let's imagine the camp is on, and your hands know their place. The best of 'em are on the face of the camp. All set. A chance occurs, and you can wangle out four or five "not wanteds" together. Take it, by all means, take it. 'Twill save much galloping. Or maybe there's an old matron or so that cares not where she be so long as the infant is with her. Diddle these out quickly as a start.

Good men round that camp will make a mort o' difference. Some chaps without thought will bung in and root the cattle out until they get a ragged edge on their tempers, and they'll do their darndest to give you trouble. Likewise some camp riders will stir up cattle, trot through 'em, and do sundry other uneducated stunts that don't belong to the job. The camp rider that knows his job will insinuate himself in amongst that camp with little more effort than nothing and barely disturb the position.

Too truly there may be some beast of either sex who was born to make trouble, and this lady or gent, as the case may be, will rudely gallop or shoulder its way through your otherwise orderly camp, and stir up some dust. Leave it be, lad. There'll come a time during the play when you get a brilliant chance, and the old wise camp horse knows it just as well as his rider. On that occasion, maybe, 'tis excusable if you bust that refractory skullion out pronto, and show him or her just what you and old Spanish have up your respective sleeves.

Spanish recalls to my memory hard days on the Hodgson and Roper. A brainy old chestnut whom you must needs ride with the girth and 'cingle a-swinging free, and the crupper was all you needed to kerb the good Hemsworth poley all jake. Round about 1895 there were few Anglo-Australian saddles, and out on a big Territory run I happened to own a Gaydon poley. Good horseman Tom Perry rode a clever camp horse known as Ivo in this, and 'twas odds on a fall several times; this is always a possibility until you learn to use the poley.

By the way, 'tis a bad habit to cultivate—that of dropping your hands on the camp horse's neck. It is generally done when the rider is getting a shade weary; likewise camp horse is weary, and he takes it as a signal for a full stop. Maybe the pace is up, and to stop old camp horse has to do a straight up and down prop, dig his toes in, and that bit of leather acts as a catpult—neither comfortable nor graceful, I assure you.

Just a word on camp drafts, as they are termed. Sure, many get a lot of fun out of camp drafting, but from the camp horse's view, and the rider's too, 'tis all skew-whiff. The beast is put out, steered maybe between two posts all O.K., gets a certain distance, and then this horse, that has been taught to put a beast out, is asked to bring it back; then before the two bewildered animals realise what is required of them, tingle-tingle goes the bell. Not a dinkum camp horse's work, I'd say, but just a handy horse on the face of a camp. More in his line.

Well, to see the whole show of camp horse's work you must attend many cattle camps, and draft all manner of beasties, and as the crowd can't get that show, no doubt the camp drafting competitions are all O.K.

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* In the "Pastoral Review" for June.

NATIVE GRASSES AND OTHER FODDERS.

By CHAS. McGRATH, Chief Supervisor of Dairying.*

Queensland possesses an extensive variety of nutritious native grasses, a number of which are noted for their drought-resisting character.

Nutritious herbage and edible shrubs, in conjunction with some 164 species of grass, constitute a natural pasturage that attracted the attention of stock breeders in the early stages of settlement and has placed this State in a prominent position among live stock countries of the world.

There is evidence, however, that the carrying capacity of our native grasses and fodder plants has greatly diminished over a period of many years.

Writings and statements of the early settlers in many parts of the State give us an idea of the wonderful growth of grasses high enough to conceal a flock of sheep, and in some localities of such a height that would allow of its being tied over a horse's back.

In a season such as the present some idea of the luxurious growth of the original native pastures may be formed from a view of the stand of native grass in railway enclosures, where they have been protected from the devastating effects of overstocking. From a glance at the areas outside the railway fences it is evident that many of the excellent varieties of grasses that once formed part of a rich, native pasture have entirely disappeared.

This serious deterioration that our native pastures are undergoing is attributable to a number of causes, the chief of which are overstocking, droughts, indiscriminate burning off by occupiers, and by bush fires.

Spasmodic cultivation has been responsible for the destruction of valuable grasses and has assisted the spread of harmful weeds. Fortunately this State has been spared the ravages of rabbits.

The preservation and improvement of our native pastures is a matter of vital importance, for on the vast fertile areas of this State will be raised the live stock required to meet the increasing food requirements of the Commonwealth and to maintain the flocks of sheep, including the high-class merino, that supply our own and oversea markets with the high quality wool that has become world famous.

To augment declining native pastures and to convert ungrassed areas into pasture areas a number of grasses have been introduced into the closer-settled portions of the State.

With the development of the dairying industry, extensive areas of what was once jungle-covered country have been converted into rich pastures for dairy stock, thereby materially increasing the meadowland of the State.

In some cases crops are grown for one or more years after the burn, while in many instances the land was seeded with grasses after the burn.

The grasses chiefly grown are Paspalum dilitatum, Rhodes, Kikuyu, and Prairie. Conditions that favoured the growth of one or more of these grasses exist in large areas on the coastal tableland and Downs portions of this State.

In the more northern portions Panicum muticum grass is also grown successfully, being favoured with a liberal rainfall.

The area under introduced grasses is approximately 546,575 acres.

The value of pasturage native and introduced cannot be too strongly stressed, as it is an all-important factor in our live stock industries and has a direct bearing on the economical production of meats, wool, dairy, and subsidiary products.

The harvesting of pastures and fodder crops by the animals lowers the cost of production, and suitable mixed pasture is a class of food that appeals to the appetites of the animals and encourages maximum yields.

The splendid crop of native pasture throughout the present season is reflected in the increased output of dairy products, and the results of the work of the herd recording officers disclose an increase in the average production per cow.

It would be difficult to over-estimate the value of our native grasses, fodder plants, and introduced grasses as harvested by the dairy cows.

In the economic harvesting of pasture and its conversion into condensed forms of nutritious food for human consumption the dairy cow stands pre-eminent amongst live stock.

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* From a radio lecture through 4QG.

The beneficial influence of succulent native pastures on the quality of our butter was mentioned by Professor Hunziker when referring to the delicate, full, natural flavour and aroma of our high-grade product.

A reference to statistical records shows a rapid development in the dairy industry in this State.

Upwards of 22,500 persons are located on dairy farms and co-operatively own and operate fifty-two butter and seventy-three cheese factories. The amount of capital invested in the industry is approximately £35,000,000, and upwards of 90,000 persons, or 10 per cent. of the population of the State, are dependent on the industry for a livelihood, which gives a yearly return of a value of approximately 7,500,000 sterling.

As large areas of Crown lands suitable for dairy farming still await settlement, the expansion of the industry in the coming years will exceed that of recent years.

The production per dairy cow varies greatly with breed, individuality, locality, quantity, and quality of pasture and food available, and there is evidence that the quality and quantity of pasturage and food available on dairy farms has a great influence on the returns from our dairy herds.

On many dairy farms native pasturage has so deteriorated that it is necessary to reintroduce suitable grasses to increase the grazing capacity of the holdings; which, together with the conservation of fodder, will prove a factor that will allow the dairy cow to yield to her full capacity and thereby increase the average yearly yield per cow.

Large areas in the coastal belt consisting of scrub-covered flats and hills, open fertile flats and forest ridges, with a rainfall of 30 inches and upwards, remain to be brought under closely-settled conditions. The grassing of scrub-covered and other suitable areas with pasture grasses such as Paspalum dilatatum, Rhodes, Kikuyu, couch, and Panicum muticum grasses is work that awaits the pioneer.

Large areas of rich scrub alluvial and forest soils are met with on tablelands and inner Downs areas.

A variety of fodder crops can be grown on such areas as well as on the coastal belts.

Considerable areas of lands suitable for the growth of lucerne also exist, and a stand of this valuable fodder should be established on every dairy farm where conditions permit of its growth.

Development of the dairying industry along efficient lines such as the breeding of high-class stock, production recording, conservation, and top dressing of pastures must receive our serious consideration.

The future prosperity of this State is chiefly dependent upon the successful development of the meat, wool, and dairy industries. The economics of these industries are closely associated with the maintenance and improvement of native pastures, the conversion of further areas into meadow lands, and the growth and conservation of stock foods.

Considering the importance of such industries to the welfare of the State, an appeal to graziers and sheep and dairy farmers to conserve and improve the pasture areas of the State should not be in vain.

AVOCADO PEARS.

The Avocado pear is one of the most nutritious and tasty sub-tropical salad and dessert food-fruits ever introduced into Queensland.

Secured direct from Professor Popenœ, of Berkeley University, San Franciso, on his arrival home from an eighteen months' tour of Mexico, Guatemala, and South America, there are growing on Mr. R. Walsh's place at Redcliffe, near Brisbane, fifteen selected named varieties from these countries, where this fruit forms the principal part of the food of the inhabitants. We are indebted to Mr. Walsh for the following note:—

"Avocado varieties vary in size, from a few ounces up to 3 lb. weight; they are grown on beautiful evergreen trees, and are from nearly round to pear shape. In colour the mature fruit ranges from light-yellowish green through dark-green to purplish-black—each fruit containing a single large seed, some tight in cavity, and others free. The flesh of the fruit is of a creamy, buttery, custard, nutty flavour, and in colour varies from pale-cream to deep golden-yellow, and just inside the skin a rich green tint. Several varieties ripen at different periods, and we hope to have them maturing over many months of the year, when they must be hand-clipped from the tree—handled carefully, not bruised or pulled or knocked off—since the Avocado is ripened best off the tree.

"Composition and nutritive values are extraordinarily rich. Personally, I think them superb as a salad; alone, or in mixture, also eaten with pepper and salt, and with or without a biscuit. The wonderful nutty flavour lingers.

"The dietetic and nutritive values of the Avocado, as revealed by investigation and analysis at Berkeley University, show them rich in vitamins, and the digestion coefficient of Avocado fat (93.8) identical with the digestibility of butter-fat. . . . The matured ripe fruit is delicious, and has just recently been properly marketed in the big cities by the Californian Avocado Growers' Organisation—graded, selected fruit only, in attractive boxes, each containing one dozen, under the registered name of "Calavos," each fruit and box being stamped with this registered title. The demand absorbs the offerings, which in a few years are expected to be 5,000 to 6,000 boxes annually. (They can be grown to perfection in Queensland.)" Mr. Walsh has been good enough at different times to submit specimen boxes of his Avocados and also grape fruit to the Department, where they are recognised as being of excellent quality.

OPEN SEASON FOR OPOSSUMS.

NATIVE BEARS ABSOLUTELY PROTECTED.

The Minister for Agriculture and Stock (Mr. H. F. Walker) made further reference recently to the intention of the Government to declare an open season for opossums extending from the 8th July to the 7th August next.

The Minister stated that he particularly wished to emphasise that the open season did not refer in any way to the koala or native bear, and this animal had been for some time receiving, and would continue to receive, absolute protection under the Animals and Birds Acts.

Cyanide and Searchlights Prohibited.

Trappers are warned that it is illegal for them to have in their possession, or use, cyanide for the purpose of poisoning opossums, and the use of flashlights and searchlights is also prohibited.

Arrangements have been made with the Commissioner of Police for the co-operation of his officers with this Department in preventing the violation of any of the provisions of the Acts which refer to the taking of fur skins.

Trappers holding permits have certain prescribed rights under the Acts, and they will be required to adhere strictly to the conditions under which the permit is issued. As a result of the activities of the rangers appointed under the Act and the Police officers, at least fifty prosecutions have been taken, or are pending, against persons who have engaged in the trapping of fur-bearing animals contrary to the Acts.

Sanctuaries Remain Strictly Closed.

No permit will be issued applying the trapper's rights to any sanctuary within the State. Additionally, owners of areas in excess of 2,560 acres are privileged, under the Acts, to reserve from the operations of trappers one-sixth of their total area for any specified purpose. All areas under 2,560 acres are exempt from the operations of trappers unless with the consent of the owner. The area now comprised within the sanctuaries in this State aggregates almost 2,000,000 acres, and the native fauna in this area is totally protected.

The Sawfly and Opossum—An Interesting Experiment.

The Minister added that a deputation of pastoralists had represented to him that the opossum was of considerable advantage in keeping in check the sawfly pest, which was in evidence in some of the pastoral areas of this State where considerable losses of stock had periodically occurred. With a view of determining the efficacy of the opossum in restricting the ravages of this pest, the Minister had arranged that an area of approximately 400 square miles in the Maranoa district had been excluded from opossum-trapping operations. The area which will be utilised for the purpose of this experiment will be kept under close observation by officers of this Department, who will, from time to time, furnish reports as to the influence of the opossum in checking the depredatory work of the sawfly.

QUEENSLAND RAIN-FOREST TREES.

By W. D. FRANCIS, Assistant Government Botanist.

The Bat's Wing Coral Tree (*Erythrina vespertilio*) is not confined to the scrubs or rain forests, but is also common in the open forests. It is a very widely distributed tree in coastal and inland parts of Queensland, and extends into the Northern Territory. The trees are sometimes known as Cork-wood. On the larger trees the bark is rough. The accompanying field picture conveys a faithful impression of the peculiar markings or rough oblique ridges which are often seen on the large trees. The wood is soft and very light. The flowers are bright red in colour and fairly large.

Photo.: W. D. Francis.]
PLATE 34.—BAT'S WING CORAL TREE, *Erythrina vespertilio*, A TREE IN RAIN FOREST OF IMBIL.

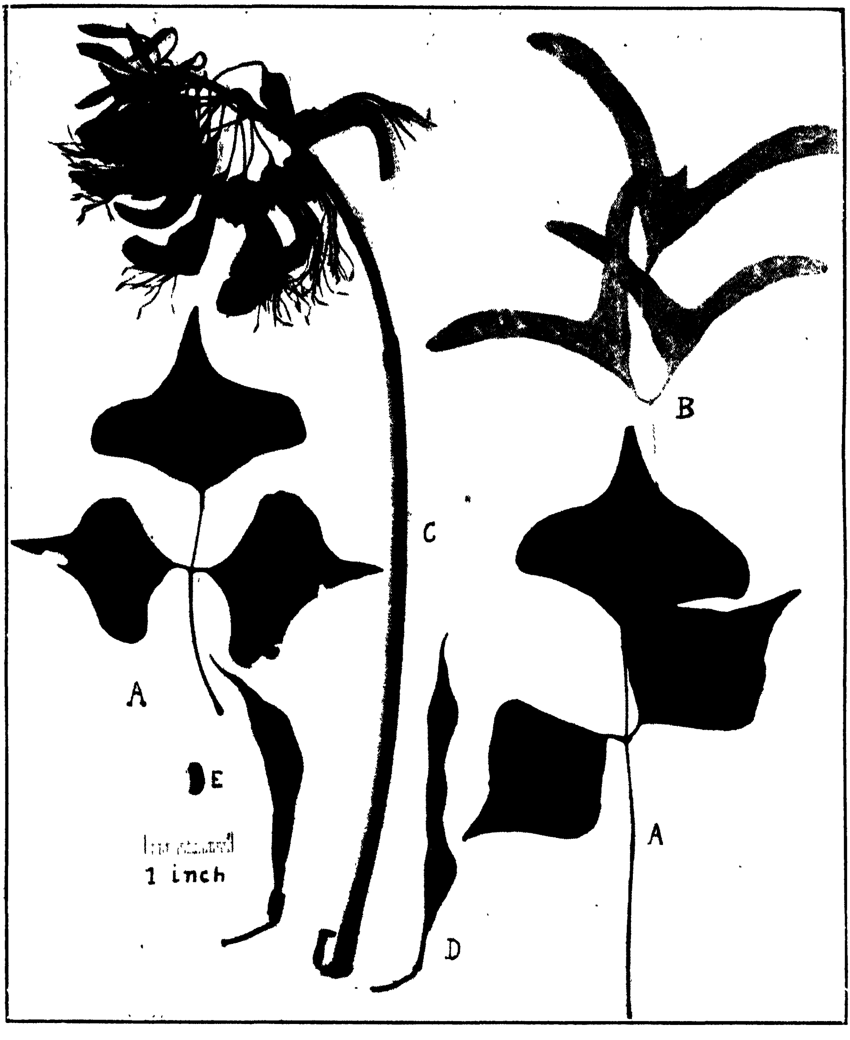

Photo.: Dept. of Agriculture and Stock.]
PLATE 35.—BAT'S WING CORAL TREE, *Erythrina vespertilio.*
A, leaves; B, leaf of the inland form of the species; C, inflorescence; D, pod; E, seed.

If you like the "Journal," kindly bring it under the notice of your neighbours who are not already subscribers. To farmers it is free and the annual charge of one shilling is merely to cover postage for the twelve months.

FARM TRACTORS.

By E. T. BROWN.*

Farm tractors have one, two, or four cylinders. The day may come when these power units are fitted with six and eight-cylinder engines. More and more motor-cars are being built with an increased number of cylinders, and there is no gainsaying it that, within reason, the greater the number the more even the turning effort, or "torque" as it is called. A one-cylinder engine gives a very jerky movement. This is due to the fact that there is only one impulse stroke out of every four. The torque during the power stroke is at least eight times that of the torque during the one and a-half revolutions of the main shaft occasioned by the power stored by in the flywheel. Two and four-cylinder engines give one and two power strokes for every revolution of the main shaft. This naturally gives more even running, and, consequently, imposes less strain on the various working parts. Most tractor engines of two or more cylinders are constructed with the cylinders behind each other, on the line principle. It is possible, however, to arrange them differently. They may be V-shaped or horizontally opposed, but as yet neither of these two types is common. The last mentioned gives particularly sweet and even running. In this case a two-way throw main shaft is employed, and the explosions therefore occur at regular intervals. This gives a perfect balance to the reciprocating parts. A four-cylinder straight engine may fire in one or two orders. Some fire 1, 3, 4, and 2—number one cylinder being the one next to the radiator or in front of the engine—or 1, 2, 4, and 3.

Lubricating Systems.

The commonest form of lubrication is by what is known as the splash system. In this case the oil is fed automatically to the sump or base by the action of a pump. A dipper is attached to the lower part of each big end, and, as the piston moves up and down, a small quantity of oil is scooped up and flung—in the form of mist or fog—over the bearings and on to the walls of the cylinders. This is a simple and efficient method, for there is nothing to go wrong except the pump. A rotary form of pump is usually employed, and this is practically everlasting. In some cases the oil on its way to the sump is caused to pass through a glass tube placed in sight of the operator. It can be told instantly if the pump be defective. As has been mentioned previously, it is extremely difficult to vaporise the kerosene: therefore, a little remains in its liquid form. This travels past the pistons and passes into the sump, where it mixes with the lubricating oil. The oil is thus thinned, and it is for this reason that makers generally advise renewing the oil every day the tractor is at work. To overcome this difficulty an outside oil reservoir is sometimes fitted. By a system of pipes a definite quantity of oil is delivered to each bearing, the oil being forced by the action of a pump. When this system is employed a sight feed is always fitted, so that the driver can determine if the lubrication is being carried out properly. Any surplus oil given off from the bearings is drained off and passed out on to the ground.

Cooling Systems.

Air cooling is efficient in the case of a rapidly moving engine, such as one fitted to a motor-cycle or an aeroplane, as the current of air passing over the cylinders is ample to dissipate the extra heat developed. But this system is not practical in the case of the tractor engine, which moves comparatively slowly at all times. Water is, therefore, the cooling agent universally employed. The upper part of each cylinder is enclosed in a jacket and water is caused to pass through it. A radiator—an arrangement of small tubes between an upper and lower reservoir—is fitted, and as the water becomes heated in the water jackets it passes into the radiator, where it is afforded an opportunity of losing its heat; hence cold water is constantly passing into the jackets. The circulation of the water may be carried out in one of two ways. A pump may be fitted, this generally being driven off the gears in the timing case. To ensure sufficient cooling a belt-driven fan is mounted behind the radiator, so that a large current of air is drawn between the tubes. The majority of tractor engines, however, are cooled on the thermo-syphon system, since the pump method is more costly and more likely to get out of order. In this case a natural law is made use of—namely, that hot water tends to rise and cold water tends to sink. As the water is heated in the jacket it rises through a pipe to the top of the radiator and cold water takes its place, while the hot water passes downwards through the radiator tubes and thus becomes cold again. Both systems are excellent. The pump system allows of a smaller quantity of water being used, because the circulation is more rapid, but the pump requires attention. The main advantage of the thermo-syphon system is that the circulation of the water is governed by the needs of the engine at the moment as it depends upon the amount of heat extracted from the cylinder walls.

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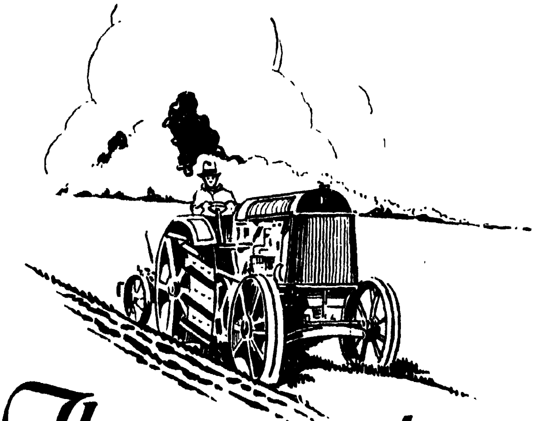
* In the "Farmer and Settler."



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RURAL LIFE IN OTHER LANDS—II.

BY THE EDITOR.*

IN our last talk on this subject we made a rapid survey of some of the trends of agriculture in France. We saw in them some resemblance to present day conditions of rural industry in Queensland, particularly in respect to the migration of country people to the city, which most of us, I think, recognise as a world-wide phenomenon. There are, however, some superficial thinkers amongst us who regard the extraordinary expansion of Brisbane and other cities and the relatively slow increase in rural population in this State as due entirely, or almost entirely, to a purely local set of circumstances, social and otherwise. In fact, the same idea is held to some extent in respect to Australia generally. A study of world-wide conditions of the agricultural industry, however, reveals to us that this rural exodus is going on in every civilised country. Particularly is this so in France.

French Agriculture.

We have considered a few of the trends in French agriculture, with the idea of learning from them some lessons, or extracting some information that might be of use to us in the study, or in our appreciation of our own particular rural problems. We showed how adaptable the French farmer is to changing economic conditions; how, when the world market was flooded with wheat, he intensified livestock production; when he lost his wool market, he concentrated on meat production; and when, more recently, the world market was swamped with frozen beef, mutton, and pork, he turned his attention more intensely to dairying. Starting where we left off: The general trends in French agriculture at the outbreak of the war, to summarise them, were: Change from cereals to fodder crops; expansion of grasslands or pastures; a much more intense interest in animal husbandry; and, to some extent, the replacement of men by women on the farms. Just here I should like to pay a passing and very small tribute to the wonderful character of the women of rural France—the women of the peasant class as they are called. During the war they took the place of their men in the field, engaging in all sorts of hard manual labour. At the same time they carried on their domestic work, attended to their children, and kept their homes scrupulously clean; and throughout the whole heart-breaking time of stress and bereavement, showed a courage and a capacity for endurance that was most inspiring and compelled our reverent admiration.

Development of Animal Husbandry.

The type of agriculture which developed from the general trends I have mentioned rendered France relatively independent of outside sources of supply as regards meat, of which only about 2 per cent. of the country's total requirements had to be imported.

Exportable surpluses of draught animals and cattle were produced and there was a net exportation of dairy products, although France imported more cheese than she shipped abroad. On the whole, trade in animals and animal products appeared as a credit item on the balance-sheet.

Cereals, particularly wheat and oats, were imported in very large quantities, but all things considered, before the war France was self-sufficient in regard to foodstuffs.

The Effect of the World War.

The immediate effect of the world war was, primarily, an enormous depletion of the nation's man-power, and, secondarily the devastation of a large area, including some of the richest agricultural districts in the country.

The general effect of the war upon agriculture in France was to intensify each of the four general trends to which I have referred and which characterised the farming of the country when the lid blew off Europe in 1914. These effects influenced in a similar manner, though to a different degree, the 77 Departments outside the war zone, the 10 Departments occupied in whole or in part by war operations, and the 3 Departments of Alsace-Lorraine which were restored to France at the end of the war.

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* In a radio lecturette through 4QG.

From the viewpoint of land utilisation, the return of Alsace-Lorraine had no appreciable effect on the agricultural situation in France. Generally speaking those provinces proved to be, what might be called a deficit region from an agricultural standpoint, for much of their primary produce had to be supplied from other parts of France, though against that was a fair proportion of root-cropped areas, grazing land, and forest country. All things considered, the acquisition of Alasce-Lorraine laid an added burden on the agricultural resources of the French nation.

In the reconstruction of French agriculture since 1919 the same difficulties were encountered as have been met with in every agricultural country. We are very familiar with the same economic difficulties in Queensland, but under a progressive—I might also say aggressive—rural policy in this State, we are doing much, in my opinion, to minimise them.

Increased Demand for Meat.

An interesting fact is that, since the war, the demand for meat in the cities and other industrial centres has increased in France. Not only has there been an actual increase in the numbers of city dwellers—the official figures for 1925 show that there were nearly nineteen millions in the actual city populations of France; that doesn't include, of course, the populations of minor towns and villages that are purely rural—but after the war the ex-service men, who had acquired a taste for beef and mutton in the army, demanded more and better meat on their return to civil life. A higher wage scale also since the war has enabled industrial workers to establish a higher standard of living than was possible in 1914.

Land Utilisation.

What impressed many of us who lived in France for some time was how the land is utilised in that country. Between the time of the French Revolution in 1790 and the middle of the last century, there had been a general expansion in agriculture. Lands that for centuries had lain unproductive as State lands or as parks and pleasure grounds of large private estates were put into cultivation. Even extensive tracts of forests were felled and the soil ploughed. Large holdings were divided into small farms and the number of landed proprietors, for the most part peasants, was greatly increased.

For more than thirty years before the world war, gradual but persistent changes had been taking place in the agriculture of France. The farmers of the nation had been slowly putting more and more of their plough lands into grass. abandoning the cultivation of cereals, industrial and leguminous plants, and putting more acres into roots, tubers, and annual forage crops. These changes in the relative acreages laid down to different field crops marked a general shift from extensive field-crop production to intensive animal husbandry. Field crops, except wheat, were produced more and more for feeding cattle and horses, the cash income of the farm being obtained in increasing proportion from the sale of animals and animal products, until during 1913-14 more than 70 per cent. of the total receipts of "middle-sized" farms were derived from this source of revenue.

The war deprived French agriculture of from 60 to 80 per cent. of its male labourers, some 3,284,000 farmers having been mobilised by 1918. Immediately following the opening of hostilities, the larger part of ten of the most productive Departments was occupied by the enemy forces. The immediate effect of the war was to cut down man power, which reacted in cutting down the acreage of all crops requiring hand labour and in increasing areas of crops that could be produced with less expenditure of labour. Cereals, leguminous plants, roots, and tubers decreased greatly during the war period, whereas grasslands and fallow lands were increased.

Soon after the signing of the armistice the French began to restore, as far as possible, the devastated provinces. The reclamation has been accomplished largely by means of power cultivation, although as late as 1925 certain areas had not been touched by the plough.

It is probable that the new levels of land utilisation established in French agriculture during the world war and post-war years are indicative of trends that are bound to become more or less permanent. The great expansion of cereal acreage in the United States, Canada, Australia, and other countries is rendering cereal production not only in France, but in Central and Western Europe (excepting Italy) less and less profitable, and the farmers of these countries are turning their attention to more payable lines of farming, in spite of attempts on the part of the Governments to bring the agriculture of each country as far as possible up to a stage of self-sufficiency in cereals from which is made their daily bread.

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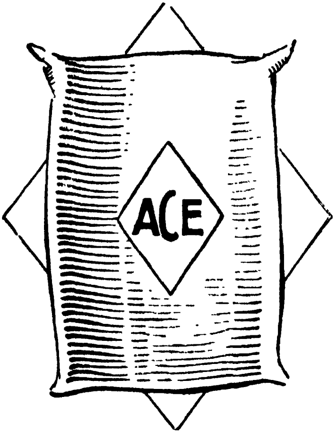

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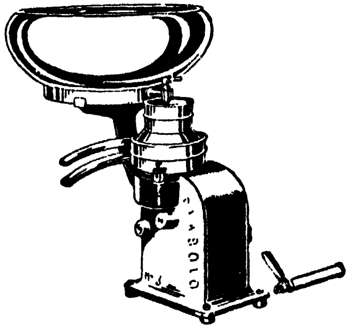

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THESE remarks were made by Mr. G. Newton, of Maleny, in a paper read at the annual conference of the Queensland Butter and Cheese Managers and Secretaries, held in Brisbane last month. "The value of the dairying industry to Australia," said Mr. Newton, "demands very great improvements in the methods of production of milk and its products. During the past ten years practically all efforts towards improvement have been concentrated on the manufacture of cheese and butter, the pasteurising of milk and cream being accepted as the solution of quality defects; hundreds of thousands of pounds sterling have been spent in rebuilding and equipping factories with modern machinery. It cannot be claimed that the results to date are satisfactory. The quality of the manufactured article certainly shows a little improvement, but, unfortunately, the percentage of choice quality butter and cheese is altogether too low. This fact, together with practically no increase in production, demonstrates that financially the industry has made no progress whatever. The raising of values by artificial means, such as the Paterson scheme, cannot be claimed as having uplifted the industry at all.

"Generally speaking, the production of milk continues in the same haphazard manner to-day as it did ten or even twenty years ago. The dairy farms still provide excellent pastures when the rainfall is satisfactory, the cows produce about the same quantity of milk, which contains no more butter-fat, and nothing more is being done towards improving the quantity of the milk and cream delivered at the factories. . . ." It appears that what is required is more assistance for the industry by educating.

More Production per Cow.

"In the first place increased production is urgently required. By this I do not mean more dairy farms and more cows, but more milk and more butter-fat per cow. I believe that this is the easiest of all problems with which we are faced to-day, and it is one that is exercising the minds of leading men in the industry throughout the Commonwealth. If every dairy farmer would realise how much better off he would be financially at the end of every year by keeping cows which would produce at least 300 lb. of butter-fat per annum, there would very soon be an enormous increase in production, and, of course, a corresponding reduction in the cost of producing butter and cheese. The experience of progressive dairy farmers in recent years has proved that 300 lb. of butter-fat per cow per annum can be produced from good pastures when the dairy herd has been selected by the use of the scales and Babcock tester. Pastures also can be improved by the use of a good strong chain harrow in the winter and spring months for breaking up and evenly distributing the lumps of manure and loosening the surface of the soil. A top-dressing of superphosphate every second or third year has been proved to be a paying proposition in many districts. Periodical ploughing and sowing of winter grass seeds of a nitrogenous nature, preferably clover, are also helpful. By increasing production the dairy farmers would be in a much better position financially, and they should be encouraged to provide fodder of some kind for use in the winter and early spring, when the pastures are not of much use; also on other occasions, when the rainfall is unsatisfactory.

The Question of Quality.

"Secondly, we come to one of the most difficult problems (and, in my opinion, the most important one) facing us to-day, viz.:—The quality of milk and cream delivered at the factories. I feel sure that all of us present will admit that the average quality of milk and cream delivered at the factories has not improved very much, if at all, during the last ten years. Factory managers must accept some responsibility for this. Apparently, too much has been expected of the pasteuriser as a means of removing defects in milk or cream before being made into cheese or butter; also the desire appears to be to cater for large supplies irrespective of quality, and then to turn out an article that while in a fresh condition will get past the grading officials as first grade or 'Kangaroo' quality, with a bit of luck. This policy, I believe, has been responsible for the low average value of Australian butter on the London market. Since the Commonwealth Government instituted a system of partial stock grading in London, we find that the majority of butter and cheese deteriorates during storage and shipment to a very serious extent. The explanation of this is, I feel certain, due to the fact that unsuitable milk or cream has been used, and the pasteurising treatment has not been effectively carried out. It is our duty to aim at producing quality butter and cheese. By this I mean an article that will open up after at least three months' storage true to label. The markets of the world will always absorb the best quality at the best price, and the purchaser is entitled to receive the best.

Importance of Cleanliness.

''Cleanliness is not given the consideration that it should receive by those who milk the cows and carry out the work in the dairies and factories. The custom is to allow any one to take a job at this work, irrespective of whether such persons have received any instruction at all as to the absolute necessity of keeping all surroundings, utensils, &c., in the milking-yards, dairies, and factories absolutely clean. Milk for cheese-making and cream for butter-making, we all know, should be cooled so as to extract the animal heat and to get rid of feed gases, but this practice is most unfortunately the exception in far too many dairies to-day. Tainted cream during the summer months, caused by unclean surroundings or utensils and uneven ripening owing to lack of cooling is a very serious matter, and there is no doubt that too much of this class of cream is accepted by the factories as first grade. The supplier is satisfied, and, in many instances, the butter gets through the grading officials as first grade, but there is very little chance of it being any better than second grade by the time it reaches the London market, although, probably, a fair percentage of choice cream has been blended with the lower grade cream before being manufactured into butter. Carelessness, neglect, and lack of knowledge are the worst amongst the enemies of the dairying industry, and until all engaged in the production of milk realise this, and make a determined effort to attack and rout these enemies, progress is not going to make any advance.

United Effort Required.

''I believe that the first movement should be a united effort by all factory managers, by tightening up the grading of milk and cream, to aim at turning out an article of undoubted quality that will maintain such quality until it has passed into consumption. This is being done in some instances, and it can be done by us all. The standard of Australian butter and cheese must be lifted out of the rut in which it has wallowed for so long on the London market, so as to obtain for Australian producers a financial return at least equal to that of the producers of New Zealand. Will Queensland factory managers make a move in this direction?''

Responsibility of Producers.

Mr. Newton stated that some factory managers who had endeavoured to raise the quality of their output by effectively grading the article supplied had lost suppliers owing to the fact that managers of factories in other districts had accepted a cream of low quality, and returned to the suppliers a higher grade for their cream. The final result of this procedure was a continuance of the present low standard and value of Australian butter on the London market. If all factories graded cream strictly according to its quality, the only form of attack left to the supplier of low-quality produce would be to improve his methods and clean up his own area. This would bring about some means of instructing all those engaged in the production of milk on the absolute necessity of thorough cleanliness at every stage in the carrying out of each part of the work. This instruction, no doubt, would be very costly, but Mr. Newton expressed the opinion that it would be justified, and in a very brief time the increased financial return to the industry would show a handsome profit on the expenditure. The instructor could give very valuable assistance to the industry by acting as herd-tester, and he also should be qualified to give lectures on such matters as top-dressing of pastures, conservation of fodder, and the feeding of cows for milk production. To be effective the area allotted to each instructor should not include more than, say, 500 average dairy farms, which would allow of a reliable service at a total cost of not more than £2 per farm.

WET VERSUS DRY MILKING.

By L. VERNEY, Dairy Inspector.

This subject has a direct bearing on the hygienic production of milk. Milk is the only perfect food containing all the elements necessary for the growth and development of the human body, consequently anything that is likely to cause a change in its nature should be carefully checked.

The healthfulness of milk depends solely upon its freedom from disease germs. Cleanliness may be preserved by the prevention of dirt contaminating the milk during the process of milking. If both these conditions are present, it naturally follows that the keeping quality will not be lacking, providing the utensils employed are sterilised before being used. The operation of milking is sometimes, unfortunately, conducted rather slovenly, and attention is not paid to absolute cleanliness in person, practice, and containers; in other words, to personal cleanliness, clean milking practices, and clean buckets.

The practice of ''wet'' milking has nothing to commend it. It is an unclean habit, and carries with it attendant evils. ''Wet'' milking, quite apart from contaminating the milk with harmful bacteria and dirt, is harmful to the cow by causing chapped teats and warts. The former results from the practice of allowing the animal to leave the milking-shed with wet and sticky teats. That very sore and annoying skin complaint known to most dairymen as ''milk rot'' is another evil effect of ''wet'' milking.

After one has had years of inspection work making notes of observations of the various phases and operations of dairying, one is able to come to a quick decision as to whether ''wet'' or ''dry'' milking is practised in any particular dairy, by examining the push-rods of the bails, division rails, leg-ropes, and milking stools for milk incrustations. These incrustations are silent but strong witnesses to the unclean habit of ''wet'' milking. In every instance where investigations have been made to ascertain the cause of the high bacterial count in the milk samples taken by the Department of Public Health, I have found that ''wet'' milking has been the underlying cause of the trouble. In no single instance have I been called upon to investigate on a farm where ''dry'' milking is practised. This alone should be sufficient to induce those dairy farmers who ''wet'' milk to adopt the more hygenic ''dry'' process. Before milking starts, the udder, teats, and flanks of the cow should be brushed. This should not be looked upon as superfluous, but as a very wise precaution, and should take no longer than is necessary to clean one's hands. If the udder and its attendant parts are encrusted with hard dirt, it is necessary to clean them with warm water—not cold, as is usually the case. The quicker action of warm water in the removal of dirt, and consequently the saving of time, should be sufficient inducement to the dairy farmer to always provide a supply of warm water for this purpose.

DAIRY PRODUCTS EXHIBITION.

ADDRESS BY THE MINISTER.

THE Tenth Annual Show of the Butter and Cheese Factory Managers' and Secretaries' Association was opened by the Minister for Agriculture and Stock (Mr. H. F. Walker) on 19th June, at the Hamilton Cold Stores.

The show was a great success, both as regards the quality of the exhibits and the number of entries, while the attendance of those interested in the dairying industry was larger than it had been for some years.

Introducing the Minister, Mr. W. S. Hartley, South Burnett Co-operative Dairy Company, remarked that Mr. Walker had been connected with the dairying industry for many years. Those engaged in that industry would find in him a sympathetic friend, who would, at all times, do everything to advance their interests.

Mr. Walker, after commenting on the tremendous amount of minute work the judges had to do, and the care and discretion which they had to exercise in forming their conclusions, went on to praise the work done by the Queensland Butter and Cheese Factory Managers' and Secretaries' Association during the last ten years. ''You are composed of the best brains that we have in the industry,'' he said, ''and you avail yourselves of anything that is to be gained from a visit of experts from the South. By an exchange of ideas and the carrying out from time to time of these competitions, particularly under existing conditions, when there are such a large number of entries of the very finest quality from all over the State, you must be doing a tremendous amount of good for the industry.''

Need for Continued Improvement.

Mr. Walker added that after looking through the exhibition, even although he had travelled the world, he had no hesitation in saying he had never seen keener competition. If only the exhibition were sent home to the old country, and placed in a warehouse in Tooley street, it would command the respect of all of the experts there, and probably of the world. Naturally, after seeing the exhibits, the question arose: "Is it possible to improve upon the effort?" At the present time they might be inclined to say, "Almost impossible." That statement, however, had been uttered many years ago, but since then they had improved their exhibits to such an extent that to-day butter was entered which was almost unbeatable, and cheese was on view which the judge said was the best he had ever judged. It was only a few years since pasteurisation came in, but look what it had done for the industry.

They now had butter second to none in the world, and much of that improvement in quality was due to pasteurisation, which was introduced only fourteen or fifteen years ago. He wanted to say that they had to go on improving their product until they were in a position to say that Australia was the best butter-producing country in the world from a quality point of view. They, too, had to remember that they had not yet reached the maximum amount it was possible to produce. When the lands now vacant were occupied, and herd-testing was universally adopted, they would find that the industry now was only in its infancy. It was their duty as citizens to develop Australia so that it would carry at least twice the population of to-day, and could produce two or three times the amount of produce it was producing to-day.

Problem of Wood Taint.

Mr. Walker recalled the words of Mr. Proud, that wood taint was the curse of the industry on the other side. "We have got to sit down as directors of our respective companies and take notice of a man like him," he said. "We must work with one common object in view, to rectify that trouble. If we cannot remedy the trouble as laymen or butter managers, then we will have to go to the department, which I can assure you will be prepared to help in overcoming this defect. In no circumstances must we have a continuance of this particular defect." The Minister said he was particularly pleased with the magnificent display. He congratulated the Kingaroy factory on winning the Australian championship in butter, and the Nanango factory on taking the Queensland championship. Although those two companies had won the big prizes, the Goombungee factory had created history by winning five firsts and a second. In the cheese section, he desired to congratulate Westbrook on winning the Australian championship, and Moola on winning the Queensland championship.

THE MILKING MACHINE—ITS CARE AND OPERATION.

At the Third Annual Conference of members of the New South Wales Agricultural Bureau for the South Coast and Monaro Districts, held at Bega (New South Wales) recently, Mr. Stan Solomon (Candelo) read a paper on the care and operation of milking machines, and the conference was so convinced of its practical nature that it is thought worth while quoting rather fully, as follows:—It is now over thirteen years since I first became acquainted with milking machines, and from experience I am convinced that the greatest factor governing success with a milking plant is absolute cleanliness. For this purpose water is required in large quantities, and provision should therefore be made to ensure a plentiful supply.

First, I will endeavour to clear up a point on which there is a great deal of misunderstanding, viz., the spread of mammitis through the herd by the machine. True, this is quite possible, but only by carelessness on the part of the dairy farmer. The examination of a few squirts of milk drawn from the cow by hand before fitting the cups on the teats will safeguard against putting the machine on an affected cow. Such cows should be returned to the waiting yard and later milked by hand. The milk drawn from the cows for examination is no great loss, as the first milk drawn from a cow contains very little butter-fat. It is likely to be contaminated with bacteria, and it is perhaps best rejected even if it is known definitely that the cow is healthy.

Mammitis can be spread through a herd by careless hand milkers just as readily as by machines. If an affected cow is milked and the milker continues milking other cows without thoroughly scouring his hands, he is taking the trouble along with him.

Affected cows should be left until last and milked into an old bucket kept for this purpose only. This prevents the germ-laden milk from reaching the floor. The habit of allowing this milk to reach the floor of the bails is all too common. A breeding ground is thus created for germs of a contagious nature, which are picked up by the cows' feet and carried to the pastures, where they gain entrance to the cow's system.

A four-cow plant may be handled efficiently by three capable people. Two need do nothing other than strip the milked cows, while the third party keeps the cows yarded, bails them, washes the teats and udders, and changes the machines from cow to cow as required. An alternative working system is for the entire staff to strip and attend to their own machines. The extra bail allows room to shift around. Waste of time must not be tolerated, or it will be reflected in increased fuel bills and general wear and tear. The work is fast but not heavy, and being soon finished the cows are at liberty to spend much more time in the pastures instead of standing about the yards.

Immediately after each milking the machine must be properly washed. Remove the rubber plug from the end of the main milk pipe. This admits a rush of air into the pipe and draws along any milk left there and delivers it to the separator vat. Next, each set of cups must be scrubbed externally to remove all dirt from them, which if left would be drawn up into the machine during the next washing and cause contamination. Then obtain a supply of cold water, about one gallon for each machine. Replace the plug in the pipe again, and commencing at the bail farthest from the releaser, place the machines, one at a time, into the water, which is drawn through the pipes. It is a good plan to keep lifting the machine from the water to allow it to clear itself; the bubbling action thus set up has an added cleansing effect also. The same operations are carried out, using boiling water to which a handful of washing soda has been added. After this, run the brush with a long cord attached through the main milk pipe. The vacuum draws this brush through; the cord is necessary when withdrawing. Once a week the cups and fittings should be entirely dismantled and thoroughly cleaned. Any rubbers that are worn out can then be renewed.

The releaser is also taken down each time and washed with the separator parts. About once a week the vacuum or main air pipe should be washed out, as a small quantity of grease from the pulsator slides finds its way into the pipe. This does not affect the milk, for it is in the pump air line and not in direct contact with any milk. To clean this pipe the pulsator drive is disconnected and the pulsators placed in the "closed" position. Next, place the small down air pipe into a bucket of boiling water containing a little caustic soda. This removes all grease from the pipe and carries it to the vacuum tank, which is then taken down, emptied, and scrubbed out. The vacuum tank must be taken down after each milking, and all taps left open to allow the free passage of air through the pipes.

This method of cleaning and general care has always been rigidly adhered to with my plant, and records over a period of ten years show no butter graded below choicest. The cleaning methods mentioned would appear to entail much time and trouble, but actually the description takes about as long as the daily cleaning, while about three hours once a week will see the dismantling through.

A 4 h.p. engine is used. This is more than necessary for ordinary purposes. An engine from 3 to 3½ h.p. will drive a milking plant and separator comfortably. It is convenient, however, to have an engine capable of operating the separator at the same time as the milking machine, for it is a great saving of time and money to complete the separating at the same time as the milking.

The cows have always behaved quietly and contentedly while being milked with the machine. The average returns over periods of machine milking compare most favourably with similar periods of hand milking. I believe if a cow is made comfortable and contented, a machine does not affect the production adversely.

I find the machine costs, on an average, £57 per annum for general maintenance, about £36 10s. being the cost of kerosene fuel. This is based on one tin of kerosene for every five days, 10s. per tin being the present price. If power kerosene is purchased in quantities of ¼ or ½ ton lots this cost is reduced considerably. Approximately £6 and £5 per annum is expended on benzine and lubricating oils, respectively. The benzine is used for starting the engine. The balance, about £9, is expended on rubbers and other replacements. Teat cup inflations last from three to four months, claw tubes from six to nine months, while the main 33-inch milk tubes and vacuum tubes have an average life of about four years.

To give best results a machine must not work with more than 15 inches of vacuum; about 14 inches is the usual working reading. In the air pipe there is a relief valve to control the vacuum suction. The stem of this valve must be oiled occasionally to prevent sticking. If the vacuum suddenly drops below 14 inches it is sure evidence of a leakage of air. Commonly this happens while a machine is being changed, but this loss can be avoided as one becomes experienced at changing. A constant leakage may be traced to an old swollen rubber ring in the releaser preventing the flap valves closing properly. If all rubber connections are found to be in good condition and the vacuum still shows a low reading, the spring on the relief valve may have weakened and become loose. This can be remedied by screwing down the spring until the gauge reads correctly. If the gauge is too high the spring, of course, must be loosened. The inflations are best kept tight; the machine then stays on difficult cows considerably better, and the milk is drawn more rapidly. A tin of water and clean cloth should be provided in each bail for washing the udders and teats of the cows.

For the man who is short of labour or desires to reduce the wages list the machine solves the problem. If it dispenses with the labour of only one man, it pays to have the machine. Added advantages are the more congenial working conditions, and the production of a cleaner and superior quality milk. The milk is cleaner, for it is under cover from the time it leaves the cow until it enters the vat. This difference is noticeable in the bowl of the separator.

During the discussion which followed, Mr. E. H. Filmer said that Mr. Solomon's advice was always of the soundest nature, and, what was more, he always practised what he preached. For years Mr. Solomon had been noted as the supplier of the best cream to the Bimbaya factory.

The question was raised as to whether machine or hand milking was the more economical during the slack winter period. It was generally admitted that milking by hand was perhaps quicker and less costly during those months when only a comparatively few cows were in milk.

In answer to a query, Mr. Solomon said that he preferred a kerosene engine because of the cheapness of the fuel, but agreed that a petrol engine was cleaner. He would not like to recommend one type of machine in preference to another.

YOUNG FARMERS AT THE BRISBANE SHOW.

ANNUAL CAMP.

The Department of Public Instruction is considering the preparation of an exhibit for the forthcoming Royal National Association's Show in August.

Last year the display was indicative of the department's activities generally. This year, in view of the growing interest in country districts in the Home Project Club scheme, it is proposed to make a display which will afford the public an insight into the nature and purpose of that particular section of the department's activities. In 1928, in connection with the Annual Show, the Royal National Association established a farm boys' camp, the members of which were nominated by the schools participating in the schools' agricultural home project movement, and an interesting and instructive week was spent in Brisbane by the selected members, addresses being given by prominent citizens, agricultural and stock experts.

This year a camp will again be held, and to attend it a selection of the most efficient members of school project clubs will be made from all the clubs operating in the country. In the pavilion will be displayed an exhibit appropriately displaying models suggestive of the interest, knowledge, and practical skill displayed, which has earned for these selected club members the privilege of attending the Show as the guests of the Royal National Association.

The possibility of showing models of the work of these schoolboy members of these agricultural project clubs is now being considered, and it is hoped that an interesting exhibit will be staged.

Photo.: Dept. of Public Instruction.]
PLATE 36.—PIG CLUB MEMBERS AT A COUNTRY SHOW.
Not the least enthusiastic exhibitors at some of the Country Shows are members of the local School Pig Club.

Photo.: Dept. of Public Instruction.]
PLATE 37.—THE BOY AND HIS PRIZE.
This earnest young Pig Club member is proud of his fine exhibit.

Photo.: Dept. of Public Instruction.]

PLATE 38. -THE PRIDE OF THE YOUNG QUEENSLAND DAIRY PEOPLE.

Home Project Schemes are becoming increasingly popular in Queensland Country Schools. Scholars voluntarily form the clubs under the supervision of trained instructors who are enthusiastic stockmen. The projects embrace Pig Clubs, Calf Clubs, Poultry Clubs, Maize Clubs, and Fruit-Packing Clubs.

Photo.: Dept. of Public Instruction.]

PLATE 39.—THE "DAY OF JUDGMENT" FOR CALF CLUB MEMBERS.

A typical scene in a country school ground when the fortunate animals, the object of the unremitting care of anxious, yet proud young owners for so many weeks, are paraded for the critical and impartial scrutiny of kindly judges.

STERILITY IN BREEDING SOWS.

E. J. SHELTON, H.D.A., Senior Instructor in Pig Raising.

We have recently received many inquiries on the subject of sterility or barrenness in sows, of which the following is typical:—

"I have two Berkshire sows and one boar which have been specially selected from a leading stud as foundation stock for my Berkshire herd. These pigs are now nearly eighteen months' old, but up to the present the sows have had no litters, and they have not shown any inclination to breed. They are running in a 2-acre paddock, sometimes with the boar and sometimes apart, but the boar does not seem to have any inclination to breed either. I think the pigs have been handled correctly though for some months during the summer both boar and sows were rather fat, but during recent months they have been out grazing and are not overfat now. What I should like to know is, is there any way of inducing sexual activity, and is it any use carrying these animals on any longer?"

The following answer was supplied:—

A great many of the cases of sterility and barrenness in pigs are due to the animals being overfat and lazy. There are many instances also in which the boar is too fat and lacking vigour. It is unfortunate that many strains of pigs, particularly purebred pigs, have been practically ruined through being kept in a very fat show condition for exhibition purposes over lengthy periods; it is equally unfortunate that many of their progeny suffer as a result and fail to breed satisfactorily if they breed at all. These conditions can very largely be overcome by reducing the condition, first by lessened diet, by the use of green foods, and also by compulsory and regular exercise. Frequent doses of Epsom salts should be given, using from two to four ounce packets per dose in half a pint of warm water, preferably as a drench first thing in the morning or in the food. The pigs should be compelled to hunt for part of their living over reasonably large, well-grassed pig paddocks (an acre or more in area). Green foods (lucerne, clover, sorghums, pumpkins, rape, and barley), root crops (sweet potatoes and artichokes, &c.) are suggested. Some cases of barrenness are due to septic inflammation of the womb, the result of germ infection due to stock being kept in unclean sties, and to boars serving clean sows after having bred to sows suffering from infectious diseases of the womb. In these cases, and in all cases where the sow will not hold to the service of the boar, it is advised to syringe the uterus with a solution of one tablespoonful of salt in one pint of sterile water, i.e., water that has been boiled and that has been allowed to cool down to blood heat. If this does not give satisfactory results, try 20 grains of permanganate of potash in one pint of sterile water at blood heat, and follow up with a salt solution every day for three days before service. During treatment also give Epsom salts as a purgative. It is advisable also, if at all possible, to change the boar, using a young vigorous animal. The sows should be kept away from the boar until they are ready for service, and after being stinted they should immediately be placed in a clean, dry sty, away from the other pigs, and should be kept quiet for several hours. If they still seem restless, mate them again the following evening and follow the same practice. Sterility is also often induced through the animals being improperly nourished and through their lacking stamina and vitality.

Many sows commence stud duties too young, many boars are also ruined in this way; neither should be so used before ten or twelve months old.

Hereditary influence is also a factor, the progeny of shy breeders often failing to breed at all. Injuries to the genital organs of the male are also a frequent cause of the sows failing to breed. The boar may have become weakened through frequent unsuccessful attempts at service, this especially so when a young boar is running with a lot of full-grown sows. The boar in this case is often punished severely by the sows and kept away from the food trough. It frequently happens that a young boar so injured becomes so "cowed" that he is ever afterwards afraid, and becomes quite effeminate. There are many other causes, too, such as the use of improperly balanced rations, diseases of the genital organs of the boar, hot, dry seasons, and so on.

The remedy lies in the removal of the cause wherever that is possible and in culling out unsatisfactory breeders. Satisfactory specifics for the treatment of pigs that are unsatisfactory breeders are well advertised. In a general way, however, we do not recommend the use of medicinal agents for the purpose indicated.

SCHOOL OF INSTRUCTION FOR PIG FARMERS.

AT GATTON COLLEGE, 10th TO 21st JUNE, 1929.

E. J. SHELTON, H.D.A., Senior Instructor in Pig Raising.

Discussing matters associated with the Second Annual School of Instruction to Pig Farmers, members of this school referred to the opportunities thus offered as an immense success; a grand opportunity for getting together; an educational treat for both young and old; and a school at which farmers in increasing numbers from every part of the State should endeavour to be present.

As at last year's function the school was again conducted at the Queensland Agricultural High School and College, Gatton, the scheme being a co-operative one, organised by officers of the Departments of Agriculture and Stock and Public Instruction.

The school represents the most important function of its kind in the pig industry throughout Australia, and is destined to become of increasing importance as its membership grows and more people become informed of its possibilities. In age the members of the school ranged from a lad of fourteen years (Arthur Mills), a member of the Gilston State School Pig Club, on the South Coast, to Mr. E. Hill and Mr. B. G. Wilson, experienced and successful farmers from the Beaudesert and Rosewood districts, with farmers of varying ages and experiences between making up the balance. It is the principal school of its type in the Commonwealth, though Farmers' Winter Schools, at which special lectures and demonstrations on pig raising are given, have been a feature in the Southern States for some years.

At this School of Instruction, Pig Raising in all its different branches is the special subject studied, though a perusal of the programme indicates that there are a wide range of subjects for study and inquiry, and quite a number of lectures and demonstrations on allied subjects with lecturers drawn both from Government Departments and from business enterprises.

Those present at the school were drawn from districts extending from Millaa Millaa on the Atherton Tableland, to Gilston, via Nerang, on the South Coast, Brigalow and Dalby districts in the West, and from other areas in the Central and Southern parts of Queensland. A number of college students attended some of the lectures, while several university students were also present when subjects of special importance were being discussed.

Pig Production.

In his opening address the Principal of the College, Professor J. K. Murray, B.A., B.Sc., N.D.D., officially welcomed the students on behalf of the Departments of Public Instruction and Agriculture and Stock. College life and routine were dealt with in detail and the visiting students were invited to dine with the college

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NOMINAL ROLL FOR PLATE 40.

Front Row (left to right)—

B. G. Wilson (Rosewood); E. J. Shelton, H.D.A. (Senior Instructor in Pig Raising, Department of Agriculture and Stock, Brisbane); Professor J. K. Murray (Principal, Gatton College); A. J. Mackenzie (Instructor in Animal Husbandry, Gatton College); Walter Baker (Chairman of Pig School Committee, Greenmount).

Second Row (left to right)—

Arthur Mills (Gilston); W. Koehler (Yamsion); Fred. Davison (North Arm); G. Muller (Brigalow); E. Hutchinson (Staff at College).

Third Row (left to right)—

A. Muller (Brigalow); Clem Manning (Department of Agriculture and Stock, Brisbane); Noel Harding (Flaxton); D. F. L. Skerman (Kaimkillenbun).

Fourth Row (left to right)—

E. Retchford (Millaa Millaa): M. Lyndon (Worongary); Robt. Turpin (Manly); Alex. Davidson (Brisbane); R. M. Moffatt (Tarome); E. Hill (Beaudesert); J. Woodward (College).

Back Row (left to right)—

Noel Muspratt (Littlemore); C. W. Bowden (Gilston); J. Canty (College); T. Friis (College); Otto Lolauja (College).

Absent—R. D. Johnston (Kingaroy) and G. A. Salisbury.

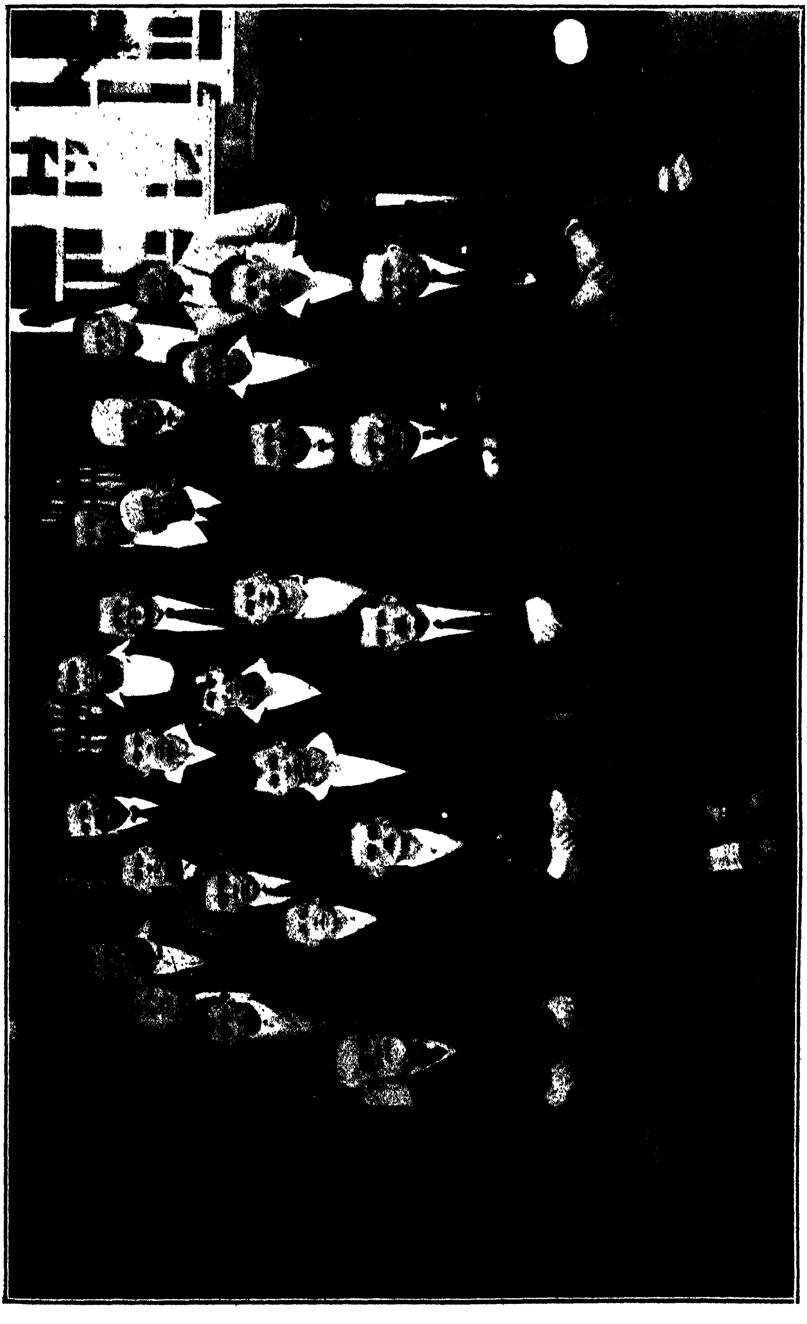


Photo.: T. Harris.]

PLATE 40.—GATHERING OF PIG FARMERS AT THE SCHOOL OF INSTRUCTION, GATTON COLLEGE, QUEENSLAND, JUNE, 1929.

(See page 82.)

students and to make the fullest use possible of the lecture rooms, library, and reading rooms; and to visit other sections of the college, as well as the Pig Section, at which he explained more than 300 pigs were kept, and where an extensive series of experiments in the breeding and handling of bacon pigs were in progress.

Discussing various aspects of the pig industry the Principal supplied statistics showing the distribution of pigs throughout the Commonwealth, and pointed out that the increase in the number of pigs throughout the Commonwealth was steady to 1917, when the number of 1,169,365 was the total for the Commonwealth. This million decreased somewhat, but passed the million again in 1925. In that year the number of pigs in Queensland was about 200,000, in Victoria well over 300,000, and in New South Wales well over 400,000. The number carried in the United States of America and Europe indicated that there should be a marked increase in hog raising in the Commonwealth. In other parts of the world, notably in the United States, the growth of maize and the raising of pigs have followed closely together. In fact, during the war years, when lard was required in large quantities, the United States fixed the price of pigs on the basis of value of 13 bushels of maize, this value being expected to encourage the use of maize for pork production. Queensland's conditions make it the greatest maize State of the Commonwealth, maize being a summer-growing crop, and Queensland enjoying summer rains. This was also a great dairying country, and there were no two better foodstuffs for pig breeding than separated milk and maize.

Economics of the Industry.

The rises and falls in the volume of pig production were more sensitive to price fluctuations than was for instance, orchard production. This followed from the ability of the farmer to increase or decrease production rapidly owing to the prolificacy of swine. A satisfactory market price was then a major controlling factor in production. The export market undoubtedly existed but the price received was not encouraging. It was well to remember that an increase of profit could be equally as well obtained from decreased cost of production as from an increased market. Studies in the costs of production at schools like this could do a great deal of good and effect a national service. The discussions of improvements in farm management indicate that very often crossbreds give the best economic returns and suit the market requirements. Information regarding the balancing of rations and the lowering of their cost, details of crossing and grading of pigs, the care of the sow and her litter—all these could greatly help in determining the cost of production. Notes on the requirements of marketing and the co-operative efforts to handle the output might indicate ways in which the farmer helps himself by helping others. The industry should be careful not to adopt schemes which encourage faulty methods and inefficiency.

Promotion of Efficiency.

Professor Murray concluded his lecture by pointing out that not only must there follow an increase in efficiency through the experiments in pig breeding at the college, but also through making full use of the great mass of knowledge already available but sadly neglected. He believed that such schools for the assistance of farmers were a most important activity of an agricultural college.

Mr. E. J. Shelton, H.D.A., Senior Instructor in Pig Raising, and Mr. Mackenzie, Lecturer in Animal Husbandry, at the college, also welcomed the visiting farmers and forecasted a very useful term of association with the college and its staff.

Syllabus.

The syllabus was a comprehensive one, and included the following:—

Subject.	Lecturer.
Agricultural Education	Professor J. K. Murray, B.A., B.Sc., N.D.D., Principal of the College.
Microbes	
Principles of Feeding	
Economic Phases of the Industry	Mr. E. J. Shelton, H.D.A., Senior Instructor in Pig Raising.
Description of Breeds	
Design and Construction of Piggeries	
General Care of Pigs	
Judging	
Results of Cross Breeding	
Preparation of Pigs for Show and Market	
Fodder Crops	College Staff.

Anatomy	Major A. J. Mackenzie, Lecturer in Animal Husbandry.
Diseases of the Pig	
Improvement of Breeds	
Physiology	
Administration of Medicines	
Post Mortem Examinations	
Commercial Pig Farming	Mr. R. G. Watson.
More Money in the Farmer's Pocket	Mr. J. F. F. Reid, Editor of Publications, Department of Agriculture.
Paper on Pig Hygiene	Mr. H. G. Cheeseman, Senior Slaughtering Inspector, Department of Agriculture and Stock.
Farm Book and Record Keeping	Mr. J. H. Woodward, Senior Clerk, Queensland Agricultural High School and College.
Soils	Mr. G. J. Saunders, M.Sc., B.E., A.A.C.I., Principal, Technical College, Ipswich.
Disinfectants	Mr. C. J. Pound, Government Bacteriologist.
Tuberculosis in Pigs	
Marketing Pigs	Mr. Geo. Setch, Marburg.
Pig Clubs	Mr. A. G. Aitchison, Organiser of Agricultural Projects, Department of Public Instruction.
Australian Stud Pig Breeders' Society	Mr. Percy Campbell, President of the Queensland Branch.
Address by Mr. Ernest Baynes	President, Royal National Agricultural Association.
Agricultural Economics	Mr. L. R. Macgregor, Director of Marketing, Department of Agriculture and Stock.
Demonstration of Value of Various Cuts of Bacon	Mr. A. B. Anderson, of J. C. Hutton's Proprietary, Limited.

Visit to Bacon Factories.

On the occasion of the visit by the party of farmers and college students numbering forty-five to the Queensland Co-operative Bacon Association Ltd. factory at Murarrie and Messrs. Foggitt Jones, Pty. Ltd. factory at Oxley (both bacon) curing and canning establishments), the visitors were hospitably received and were shown every possible courtesy. They were given the opportunity of inspecting the several sections of the plants, noting the treatment of pigs from the time they arrived by train or road from farmers throughout the State, to the time they were slaughtered and converted into innumerable appetising products. The party was particularly impressed by the immensity of the business and with the up-to-date system adopted at these factories, and in the efficient and expeditious handling of the factory products. At Foggitt Jones, Pty. Ltd. a display of no fewer than forty-five lines of canned delicacies was on view in addition to other fresh and preserved products. Luncheon and afternoon tea were provided at these functions, pork products being a special feature of the menu.

At Murarrie.

In a short address Mr. J. A. Heading, Chairman of Directors of the Queensland Co-operative Bacon Association Ltd. at Murarrie, welcomed the party of farmers and students and emphasised the importance of farmers visiting the factories at which their pigs were treated, so that they would become more conversant with the classification and grading of the animals and carcases and with methods of manufacture and distribution.

Mr. Heading thought the building up of co-operative bacon factories owned and financed entirely by the farmers should engender a pride in the heart of every producer, especially as in this case, the factory had only been established fourteen years. He explained that the co-operative factories were run entirely in the interests of the farmers resident in the State and pigs were treated. both on behalf of the shareholders and other suppliers, the resultant profits being utilised both for payment of bonuses as well as for providing funds for financing extensions of operations, and in making provision for future years.

He dealt with the type and quality of the pigs marketed and was proud to say there had been a marked improvement in this regard in recent years. There were, he said, unfortunately, still a number of pigs coming forward that were not suited to the requirements of the curer, and the treatment of these incurred a heavy loss on the factory. It was a fact, he added, that the consumers as a body were much more particular now-a-days than they were in years gone by. The housewife wanted prime quality, fleshy pork, bacon, and ham, and she did not want it too fat, nor would it suit if it were too lean, and there was but little sale for heavy weight meat of any description. It therefore behoved everybody to take a keen interest in the business so that they could give the consumers the article they required and were prepared to pay for in increasing quantity.

If this could be done it would mean more money in the farmers' pocket and greater profits in the process of manufacture. Good seasonal conditions, he explained, often resulted in farmers holding the pigs too long on their farm and then marketing them in an overfat condition. This was a means of utilisation of greater quantities of farm foods, but farmers should remember that market demands were more stable than seasons. They should, therefore, aim continuously at marketing at prime weight and in medium condition, pigs showing a larger proportion of lean meat than fat.

Development of the Industry.

He stressed the extent to which the industry had developed in recent years, but emphasised that market requirements were also changing, and there was little likelihood of a return to the days when heavy fat meat was in demand. Conditions overseas had changed also, though the 200 lb. comparatively fat pig was still saleable there. Consumers in colder countries could do with a good, thick slice of fat with their bacon and ham, but where warmer climatic conditions prevailed there was and had been a decided tendency to reject the fat in favour of more lean meat.

He explained that the Queensland Co-operative Bacon Association was made up of 5,000 shareholder suppliers, and about 1,000 more in process of becoming shareholders in the concern. He did not think the producers need fear over-production so long as the quality of the pigs were maintained. Farmers in every portion of the State had actually proved in their own factories that they could produce and market stock of desirable quality at lucrative prices, and he urged them to give a greater consideration to the matters such as were being stressed at the pig school and by the various marketing organisations. More than £2,000 were recently spent at Murarrie in improvements and still further additions were contemplated.

He also emphasised the importance of strict attention to cleanliness and sanitation, with a view to reducing losses and ridding their farms of disease. He hoped the various schemes for providing instruction for both senior and junior farmers would expand, until every portion of the State was provided for and every farmer fully informed as to the importance of producing clean, healthy pigs.

Theory and Practice.

Mr. A. J. Mackenzie thanked the association, on behalf of the college, for the opportunity the party had enjoyed of seeing the operation of the factories. The college, he said, could teach the theory, but it remained for the factories to demonstrate the practical aspect from the killing floor to the consumer's plate.

Mr. Shelton also thanked the directors and management for their courtesy and hospitality, and explained that there were farmers present from many distant portions of the State. He hoped farmers would busy themselves and ask as many questions as possible with a view to gaining greater knowledge. He also hoped that at future schools similar opportunities would be provided, for thus bringing farmers and their sons together.

Mr. Walter Baker, chairman of the Pig School Committee, thanked the directors and staff on behalf of the farmers and felt sure that much good would result from the visits.

At Oxley.

At the Oxley Factory the party were met by Mr. F. W. Martin, representing the Proprietary Bacon Factories of Queensland, Mr. Waters, of Foggitt Jones, Pty. Ltd., Mr. White, foreman of the Oxley Factory, and Mr. Shand, foreman of the Canning Department, and were shown over the whole of the plant, including that portion of the works where cattle are treated in increasing numbers each year.

Back at the College.

In the course of an address Mr. George Setch, of Marburg, a prominent local farmer and a director of long standing at the Queensland Co-operative Bacon Association Limited, referred to his experiences during visits to countries overseas, where pigs are marketed in far greater numbers than is the case in Australia. He also stressed the value of the production of pigs of correct type and quality, and the utilisation on the farm of as much of the farm produce as possible. He stated that in his experience over a long period of years he had marketed thousands of pigs at a profit. To do this he had utilised food produced on his own property and had not sold a bag of corn or a bale of hay, except as pigs on the hoof or cream in the can. He recommended all present to aim at reducing costs of production by more efficient methods and by studying the market conditions at all seasons of the year.

Mr. John Hardcastle, of Dugandan, was unfortunately unable to attend to give his address on Weighing and Branding of Pigs, and Mr. F. W. Martin, of Stock Agents Ltd., through indisposition, was compelled to forego the opportunity of addressing the gathering as a representative of the Proprietary Bacon Factories, on the marketing of pigs.

Mr. A. B. Anderson, of J. C. Hutton's Pty. Ltd., gave a short talk on the importance of studying the requirements of the consumer.

A ''pork products luncheon'' was supplied through the courtesy of the Queensland Bacon Curers Association, representing Southern Queensland Bacon Factories.

In next month's journal several of the interesting papers read in the course of the school will be summarised for the benefit of those who were unable to attend the school.

SUBSCRIPTIONS TO THE JOURNAL.

Subscribers are reminded that when a cross is placed in the square on the first page of the Journal it is an indication that the term of their subscription ends with the number so marked, and that it is advisable to renew immediately if they desire the retention of their names on our mailing list.

To farmers, graziers, horticulturists, and Schools of Art the annual subscription—one shilling—is merely nominal, and the charge is only imposed to cover the cost of postage. To them, otherwise, it is an absolutely free issue. Members of agricultural and similar societies who are not actively engaged in land pursuits are asked to pay five shillings a year, while the annual subscription charged to the general public is ten shillings.

Farmers particularly are urged to keep their names on our mailing list, for through the Journal they may keep themselves well informed in respect to the activities of the Department, and other matters with which they are directly concerned. Instead of sending just the annual subscription along it is suggested that, when renewing it, they do so for a longer term. For instance, five shillings would keep their names on our subscribers' register for five years. By doing this they would obviously help to reduce clerical labour as well as avoid the inconvenience to themselves of posting annually the very small sum necessary to keep their names on our mailing list.

On another page an order form may be found, and for those whose annual subscription is about due what is wrong with filling it up now and posting it direct to the Under Secretary, Department of Agriculture and Stock?

Answers to Correspondents.

BOTANY.

Replies selected from the outgoing mail of the Government Botanist, Mr. Cyril White, F.L.S.:—

"Wheat Grass."

S.D. (Oakey)—

Your specimen is *Agropyrum scabrum*, a fairly common grass in parts of Queensland and New South Wales, generally known by the name of "Wheat Grass," and always occurring in small patches in the ordinary mixed downs pasture. It varies considerably according to the class of soil on which it is growing, but on the better-class soils makes a good vigorous growth of rather succulent forage relished by stock, and is of value as growing through the winter and spring months when other food is scarce.

"Caustic Creeper"—*Euphorbia Drummondii.*

J. J. O'S (Boobin, Great Northern Railway)—

Your specimen is the "Caustic Creeper", *Euphorbia Drummondii*, found in practically all the Australian States, and generally regarded as poisonous to stock. "Caustic Creeper" is a name commonly given to it, though in Queensland it is just as frequently known by its botanical name. Reports about the poisonous properties of this plant in the past have been very conflicting, sheep at times having eaten fairly large quantities of it without ill effects following, but having more effect on travelling stock than on resting sheep or cattle. In New South Wales it has been found recently that the plant commonly possesses a prussic-acid-yielding glucoside, but though for some years past we have made repeated tests with the Queensland-grown specimens, they have always yielded negative results, and the symptoms as reported by drovers, &c., are not those of prussic-acid poisoning. The general symptoms of poisoning by this plant are a distinct swelling in the head and neck of the affected animals. Sometimes when these are particularly large they are opened by sheepmen and an amber-colourd fluid exudes. The sheep may recover, but the face has the appearance of having the skin scorched off it.

Dip for Spraying Horses.

K.N. (Wellington Point) asks what is the maximum proportion of phenyle (sheep dip) and water that may be safely used as a wash on a horse troubled with ticks. Veterinary Surgeon J. A. Rudd advises:—

I find Cooper's Cattle Dip best for spraying horses. One ounce of Cooper's Dip to one gallon of water makes a strength of 1 to 160. I have sprayed a horse at a strength of 1 to 150 with Cooper's Dip once every seven days for two years without any harmful results. One ounce of Cooper's Dip to seven and a-half pints of rain water will make this strength, and hand-washing is not advisable. Spraying is the better method, and should be practised when using Cooper's Dip. I have seen some bad results caused by hand-washing at this strength.

Australian Grapes in Canada.

D.G. (Stanthorpe)—

The Australian grapes consigned to Vancouver by the s.s. "Niagara" were of the Obanez variety, and were packed at the Griffith (N.S.W.) Producers' Co-operative sheds under the supervision of Mr. V. C. Williams, a director of the company, and shipped on or about 11th April last.

The cases used were three-quarter bushel with a centre division, and were made of white American case wood (spruce or hemlock).

At the time of packing the fruit was on the green side, and was allowed to wilt until the berries showed signs of shrinking; the time allowed for wilting varies from two to five days, according to the weather conditions.

The cases were first lined with paper, a layer of cork placed in the bottom, and then a layer of grapes, which were covered with cork, and the cork shaken well through the bunches. The second layer of fruit was then packed and the case filled with cork dust, care being taken to see that a reasonable quantity of cork was between the fruit and the sides of the case. After nailing down, two wires were bound round the case. The cases contained from 21 lb. to 22 lb. of grapes, and approximately 4½ lb. of cork dust. According to a Press message from Vancouver of 2nd May, the shipment arrived in perfect condition. The flavour of the fruit was reported to be excellent, and the price at which they sold on an eager market was 1s. 6d. a lb.

DIRT AND DIET DEFICIENCY IN PIGS.

Good food, in a fresh state and fed under cleanly conditions, goes a long way towards preserving health in pigs.

Good food means food which in the total has all the elements of nutrition. Pigs, like other animals, must have a proper proportion of such mineral substances as lime and phosphorus for the building of their frames, and especially is such a sufficiency important in the case of breeding sows—neglect to ensure it results in bad litters and poor growth. There are strong indications that mineral deficiency is the factor responsible for a number of those conditions described as paralysis, and it is also intimately associated with rickets.

Deficiency of lime and phosphorus can be repaired by the addition to the feed of, say, half an ounce (about a dessert spoonful) daily of sterilised bonemeal. A supply of wood ash and charcoal, to which a little sulphur and salt have been added, is also appreciated by the young pigs, and supplies any shortage in the mineral constituents of their food.

The pig is well adapted for the disposal of many waste foods of the household, farm, orchard, and dairy, but unless these foods are in a sound and wholesome condition serious troubles may be caused by their use, and the quality and market value of the carcase may suffer. Scours and inflammation of the stomach and bowels are usually due to incorrect and filthy feeding. Food such as swill, skim milk, and buttermilk which is stored in old tanks, casks, and like receptacles is liable to cause similar trouble if no effort is made to keep the vessels in a sanitary condition.

Strict cleanliness with regard to vats, troughs, and other feeding utensils is essential. Uneaten food should be removed, and the troughs cleaned before another supply is given. Where swill and hotel refuse is collected for food it should be fed before it becomes soured, since there is great danger of poisoning from soured swill. In addition, it should always be boiled before use.

Fruit, vegetables, and root crops when rotting are also a common source of digestive derangement, whilst maize fed in a mouldy condition may cause poisoning and nervous disorders. The danger of sickness may be lessened in all these cases by boiling the food before giving it to the pigs.

Pamphlets of interest to pig farmers are available free on application to the Under Secretary, Department of Agriculture, William street, Brisbane.

ANIMAL MANURES.

Farmyard manures are solid and liquid excreta from animals, and form one of the universal manures used by most gardeners—complete for all purposes in horticulture. It must, however, be used with care and intelligence. In some places where large and cheap supplies are available, the soil is saturated with manure.

The greater the quantity of manure incorporated with the soil, the greater the necessity for plenty of fresh air to bring about decomposition and ultimately humus. Now, if a soil has not been deeply dug or trenched, and it happens to be of a heavy nature, it is possible that the rains will not pass away readily; then the manure begins to get sour, fresh air, with its oxygen is driven out, carbonic acid gas develops too freely, and the beneficial bacteria are suffocated or annihilated by their enemies, which come into being owing to the lack of fresh air.

To avoid these troubles the soil should be well and deeply dug, and whenever extra large quantities of manure are used, the soil should be afterwards dressed with lime to keep it in a sweet condition.

General Notes.

Staff Changes and Appointments.

Messrs. A. H. Corry, M.R.C.V.S., E. Baynes, P. Short, and Jas, Sprott have been appointed Members of the Southern District Stallion Board. Major Cory will act as Chairman of the Board.

Mr. J. H. Gregory, of Melbourne, has been appointed Instructor in Fruit Packing, on probation for a period of six months.

The following have been appointed Assistant Cane Testers for the forthcoming sugar season, at the mill set out opposite each:—

> Miss O. Knight, Bingera; Mr. T. F. Corbett, Marian; Mr. C. H. Humphreys, Moreton; Mr. H. T. Whitcher, Maryborough;

and Miss E. Rowe has been appointed to Millaquin Mill instead of to Marian Mill as previously approved.

The resignation of Mr. D. A. Parker, of Eungella, Mackay, as Officer under the Animals and Birds Acts has been accepted as tendered.

Mr. J. Legg, D.V.Sc., M.R.C.V.S., Townsville, has been appointed Chairman of the Northern Opossum Board, vice Mr. W. R. Holmes, transferred.

It has been approved that Messrs. E. T. Lewin and S. C. Allan, Inspectors of Stock, be attached to Julia Creek and Cloncurry Districts, respectively.

Mr. Thomas Law, of Arawee, Adavale, has been appointed Government Representative on the Adavale Dingo Board, vice Mr. F. B. Rutledge, resigned, and Mr. R. E. Gibson has been appointed a member of the Board, vice Mr. W. Hazlett, resigned.

The following members of the Police Force have been appointed Inspectors of Slaughterhouses:—Acting Sergeant M. Cranitch, Wondai; Constable C. B. I. McNaught, Yaraka; and Constable T. E. Martin.

Mr. W. J. Sheahan has been admitted to the Public Service and appointed Inspector of Stock on probation, and will be stationed in the Helidon district.

Mr. H. A. Galloway (Clerk, Depositions, Petty Sessions Office, Brisbane), at present seconded for duty to the Chief Secretary's Office, Brisbane, has been seconded for duty to the Chief Office, Department of Agriculture and Stock, as from 6th June, 1929, and until otherwise determined.

Mr. A. H. Knuth has been appointed trappers' representative on the Northern Opossum Board, vice Mr. A. H. Baumann, and Mr. Thos. Fisher appointed trappers' representative on the Northern Coast Opossum Board, vice Mr. Daniel Brophy.

The following have been appointed Cane Testers and Assistant Cane Testers for the forthcoming sugar season, and will be stationed at the Mills set out opposite them:—

> Cane Testers.—Miss S. Riley, Babinda; Mr. V. F. Worthington, Cattle Creek; Mr. C. J. Boast, Fairymead; Miss I. Palmer, Farleigh; Mr. T. D. Cullen, Gin Gin; Miss A. L. Levy, Isis; Mr. H. Jensen, Inkerman; Mr. P. H. Compton, Marian; Mr. W. J. Richardson, Kalamia; Mr. L. Chadwick, Maryborough; Mr. L. G. F. Helbach, Millaquin; Miss M. T. Smith, Moreton; Mr. A. G. Kelly, Mulgrave; Miss D. Marles, Mourilyan; Mr. T. Herbert, Mossman; Mr. C. H. Jorgensen, Pioneer; Mr. T. V. Breen, Pleystowe; Miss F. Parkinson, Proserpine; Miss J. O'Flynn, Qunaba; Mr. L. C. Home, Racecourse; Mr. J. Howard, Rocky Point; Mr. F. C. J. Jorss, South Johnstone; Miss E. Christsen, Tully; Mr. W. J. Mason, Bingera; Mr. W. Ahern, Invicta; Miss J. Orr, Mount Bauple; Miss N. Walsh, North Eton; Mr. T. P. Brown, Plane Creek.
>
> Assistant Cane Testers.—Miss M. A. Lyle, Farleigh; Miss G. Dingle, Inkerman; Mr. G. Tait, Kalamia; Miss D. Bowder, Marian; Miss E. Rowe, Marian; Miss M. Whittle, Plane Creek; Miss C. Humphreys, Pleystowe; Miss A. Mullin, Pleystowe; Miss M. A. Morris, Proserpine; Miss M. Orr, Tully.

New Sanctuaries—Islands off the Central Coast.

Miall and Middle Islands in Keppel Bay, Heron Island in the Capricorn Group, and portions of Westgrove and Warrinilla Holdings, lying to the north of Injune, have been declared sanctuaries for animals and birds. The lastnamed sanctuary was made in view of the fact that the opossums therein are doing valuable work in the destruction of the caterpillars of the Saw Fly, which do much damage to stock in the district.

Merging of Important Australian Industries.

Users of rubber tyres and rubber products of every description throughout Australia will no doubt be interested in the union of the Dunlop and Perdriau companies. The development of these two Australian enterprises since their formation has been phenomenal, but it was realised that by a consolidation of interests considerable economy would be effected.

In future the new organisation will be known as the Dunlop-Perdriau Rubber Company, Limited.

Its aim is, in brief, to make Australia independent of supplies from outside sources so far as manufactured rubber goods are concerned, and the company hopes to merit the hearty support of all Australians towards achieving this worthy objective.

Who——?

"I am the foundation of all business. I am the fount of all prosperity. I am the parent of genius. I am the salt that gives life its savour. I have laid the foundation of every fortune. I must be loved before I can bestow my greatest blessings and achieve my greatest ends. Loved, I can make life sweet and purposeful and fruitful. I can do more to advance a youth than his parents, be they ever so rich. Fools hate me; wise men love me. I am represented in every loaf of bread that comes from the oven; in every train that crosses the country; in every newspaper that comes from the press. I am the mother of Democracy. All progress springs from me."

"Who am I?" "What am I?" "I am Work."—"Cummins and Campbell's Monthly Magazine" (Townsville, North Queensland).

Country Correspondence Pupils—High Percentage of Scholarship Passes.

Nineteen candidates of the State Correspondence Primary School passed this year's State scholarship examination, and, as that school presented twenty-seven candidates, its average percentage of passes was in excess of the percentage obtained by the State schools generally.

The Minister for Works and Education (Mr. R. M. King) has expressed his satisfaction at this result, and pointed to another very pleasing feature of the work of the Correspondence School. It was that two scholarship candidates—one from the South-west and the other from the Central district—each of whom had joined the Correspondence Primary School at its inception seven years ago, and had passed through it from its lowest grade of the first class, had been successful. In the seven years they had covered the whole range of primary school work, thus demonstrating that they had made progress quite as rapidly as pupils attending the ordinary State schools. "The objective of the State Correspondence School is to pass its pupils through all the grades of primary instruction to the secondary school standard," said Mr. King, "and that objective is being achieved."

Commercial Aviation in Australia.

With the idea of stimulating interest in aviation in Australia along the lines of privately-owned aircraft, the Shell Company of Australia has purchased a modern triple-engined machine with which it expects to carry out useful exploratory and experimental work. The machine will show the latest development in aeroplane construction, and will, it is expected, be the only one of its type in Australia.

The flying operations of the company will be in charge of Captain E. F. Jones, M.C., D.F.C., who has resigned the position of Deputy Controller of Civil Aviation to take over the work. Captain Jones has had lengthy experience with flying operations, both military and civil. He served with distinction during the war as Flight Commander with No. 3 Squadron A.F.C. On his return to Australia, he joined the Australian Air Corps which formed the nucleus of the present R.A.A.F. When the Civil Aviation Branch was formed, he was appointed to the position of Superintendent of Flying Operations. Captain Jones's cross-country flights in Australia date from 1921, when he flew from Melbourne to Derby via Perth, and then back to Melbourne again. A little later he made the first journey to encircle the Commonwealth in a land type of machine. He is remembered, too, as making the flight with Colonel Brinsmead to Darwin to meet Cobham on his arrival in Australia from England. More recently, he carried out a flight from Melbourne to Normanton and return in the remarkable flying time of 36 hours, taking only four days for the entire trip.

It is anticipated that Captain Jones's appointment to this charge of the flying operations of the Shell Company will usher in a period of extensive activity in that company along the lines of industrial aviation.

Banana Grades in Victoria.

According to a Press message (25th June, 1929) from Melbourne new regulations governing the grading of bananas have been approved by the State Executive Council. The regulations fix four grade standards for Cavendish bananas. The first grade, described as "special," must consist only of sound, clean bananas of a minimum length of 9 in. and a minimum circumference of 5 in. The next grade, described as "choice," must consist of clean, fresh fruit of a minimum length of 8 in., and a minimum circumference of 4¾ in. Bananas in the third, or "standard" grade, must be not less than 6½ in. in length and 4½ in. in circumference. The fourth, or "plain," grade must consist of fruit of a minimum length of 5½ in., and a minimum circumference of 4 in. When bananas of any grade other than Cavendish are sold in any parcel, the bananas must be marked plainly to show the varieties included.

Increased Dairy Production.

Speaking at the recent Butter and Cheese Factory Managers' Conference, Mr. M. Wallace invited attention to the question of increased production. This question was sometimes viewed, he said, from an oblique angle. He stressed the necessity for greater efficiency in the direction of obtaining greater production per cow. There was no country in the world where the conditions were always favourable for dairying, and unless they were prepared to accept the role of waiters upon Providence, they must mitigate unfavourable circumstances by making preparations for bad times. The factory managers should exert themselves to stimulate their suppliers in regard to providing fodder reserves, so that milk production would be maintained throughout the year. While the return from the exported surplus of butter did not on present prices, and on the basis of the average production per cow, offer tempting prospects, the position would be entirely altered if they could produce 3 lb. of butter for every 2 lb. now yielded, without increasing the cost. It was no exaggeration to say that this was possible.

Synthetic Wool.

Of an exhibition in London of articles made from a mixture of wool and synthetic wool, by Textiles (New) Process, Limited, the company holding the world rights of the artificial product known as N.T., an English paper said:—"By using the N.T. as an admixture, it will be possible, it is hoped, to lower the cost of the raw materials used in a wide range of woollen textile productions by 35 per cent., and in certain cases by an even greater amount. Actual manufacturing tests are claimed to have proved that the artificial product, the basis of which is a waste vegetable material, dyes equal to wool, is as durable as wool, and washes in the same way, and with the same results. It can be spun in counts up to 95 mm., and woven by existing woollen machinery. In this respect it differs from artificial silk, as well as in the fact that operatives do not have to undergo a special training before they are accomplished in its use. If the claims made for the new product are realised, they should prove as advantageous to this country as the discovery and manufacture of artificial silk. In the same way as the prosperity of the artificial silk industry has favourably affected the demand for real silk, so an artificial wool, which passes the most exacting tests, should increase the demand for wool."

A Reminder about Leaf Curl.

The disease known as leaf curl affects various stone fruits, but it occurs mainly in the peach, and in seasons favourable to its development the question of how to deal with the condition is a matter of frequent inquiry. Unfortunately, by the time the disease has made itself evident, it is too late to do anything. Leaf curl is caused by a parasitic fungus, and if it is to be avoided the grower must spray his trees with a fungicide spray in the winter, before the swelling of the buds.

Lime-sulphur, Bordeaux mixture, or Burgundy mixture should be applied at winter strength. If desired, miscible oil may be added to Bordeaux, thus making a dual-purpose spray.

It is most important that the trees be sprayed prior to swelling of the buds. Later applications are of absolutely no value in control of this disease; moreover, these sprays themselves may cause defoliation of peach and nectarine trees if applied after the setting of the fruit.

If the disease is observed to have caused serious defoliation of the trees through failure to spray at the correct time, the new growth of leaves may be facilitated by a light application of a quickly acting fertiliser such as sodium nitrate.

Imperial Bureau of Soil Science.

The Imperial Bureau of Soil Science (one of the eight bureaux the formation of which was recommended by the Imperial Agricultural Research Conference of 1927) commenced work on the 1st May at the Rothamsted Experimental Station. Sir John Russell, Director of Rothamsted, is also the Director of the Bureau, and Dr. A. F. Joseph, lately Sudan Government Chemist, has been appointed Deputy Director. The functions of the bureau include the collection and distribution of all research work on soils of importance to the British Empire, the assistance of research workers in the prosecution of their investigations in whatever ways it can, the bringing together of workers from different parts of the Empire (either by correspondence or in conference) interested in the same subjects, and to supply information generally which may facilitate the work of soil experts in the development of agriculture.

It is hoped that before long the bureau will be in close touch with all soil investigators of the Empire, both at home and abroad, and that by means of information circulars and other methods the results of studies carried on in one part of the Empire will be made available for all. Arrangements will also be made to supply information dealing with soil investigations in foreign countries, the results of which (owing to language or other difficulties) are not readily available.

Queensland a Tropic Wonderland—Southern Visitors Impressed.

The newly-appointed Director of the Australian National Travel Association (Mr. C. H. Holmes), who is paying an unofficial visit to Queensland, in company with the Director of the Victorian Government Tourist Bureau (Mr. Gollan), has informed the Press that a commencement would be made this month on the detailed work of advertising Australia with the object of attracting a greater number of investors, investor-settlers, and tourists, as well as dissipating the colossal ignorance which exists overseas regarding our country.

"Although I have travelled extensively, particularly in the far North," remarked Mr. Holmes, "I never realised until this visit that within forty-four hours of comfortable travel from Melbourne, and twenty-six hours from Sydney, where there are over 2,500,000 people, the visitor can not only be transported into winter sunshine, but can enjoy a tropical wonderland of fruits and vegetation. Yesterday I saw the palm grove on the coast side of Tamborine Mountain. I am told that but a small percentage of Queenslanders have been there, and that the vast majority of visitors to the mountain miss seeing this remarkable grove of giant palms and enormous crow's-foot, elms, and other unique trees, shrubs, and ferns. In my opinion, it is superior to anything of the kind in other parts of this State, and is worth travelling across a Continent to see. This grove, together with the tropical fruit areas within easy distance of Brisbane, and others further North, in the Nambour area, have much impressed me from a tourist point of view. These are the features the Southerner and the overseas visitor are most anxious to see, although, perhaps, they may be commonplace to Queenslanders. From Tamborine Mountain, I saw a golden beach with rolling surf. Mr. Harold W. Clapp told me he thought it one of the finest surf beaches in Australia, and possibly in the world. To-morrow I hope to see it at close quarters.

"The popular conception down South is that you must travel to the far North to enjoy the tropical presentations I mention, that it costs much money and much time, and with many the idea of visiting Queensland is thus not further explored in detail. Mr. Gollan shares my view, and he, of course, has close contact with the public. I think that in the Great Barrier Reef—that submarine chain of mountains which scientists tell us is built up of 'little lumps of animated jelly'—Queensland possesses one of the wonders of the world. If exploited, the reef should prove one of the greatest tourist features of Australia. Some day, perhaps, seasonal encampments, or hotel accommodation, will be erected on the reef, so that tourists may visit this unusual and scenic area. The Australian National Travel Association, in which Mr. J. W. Hayes is seeking to interest Queenslanders, will be in a position to materially help this amazingly interesting State. It will take a broad survey of the whole of Australia, and then proceed to classify travel for advertising overseas, both in a broad way and in detail. The association will also seek to co-ordinate effort in Australia as between the various entities interested in travel. In the past, I suggest that too many matters have been left to the Government. This project, although supported by Governments, is not in any way subject to Government control. It is a job entrusted to business men to carry out as they see fit. Here is an opportunity for Australians to co-operate and do something for themselves in a business-like way. Australia," concluded Mr. Holmes, "has done something for all of us—let us do something for Australia."

What is a Dairy Herd?—An Important Ruling.

What constitutes a dairy herd of forty cows was a point raised in action before Mr. Justice Mocatta and a jury at the Grafton (N.S.W.) District Court recently. The action was for a breach of a share farm agreement, alleging failure to keep the plaintiff supplied with at least forty milking cows. For the plaintiff it was said that the defendant never gave the plaintiff forty cows, except for three months, when she had fifty-two. Sometimes she had only twenty and twenty-four, and as low as eighteen. The defendant contended that he supplied the required number of cows.

For the defendant, it was said that in a dairying district the term "dairy herd" had a certain recognised meaning. His Honour thought the words "dairy herd of forty cows" meant forty cows capable of being used as dairy cows for milking purposes.

Counsel for defendant contended that a dairy cow was a dairy cow whether it was milking or not, the same as a peach tree was a peach tree although it might not at the particular date be bearing peaches. His Honour said the agreement stipulated for a dairy herd of forty cows, and it obviously meant that cows in milk should be provided during the period of the agreement.

This could not be taken to mean that the plaintiff should be supplied with forty cows in full milk every day of the year.

His Honour said that was what the agreement implied. If the defendant made such an agreement, that was his lookout. He did not see how it could be put any other way. A non-milker could not be used as a dairy cow.

Lengthy evidence was given, and the hearing occupied the best part of two days. The jury returned a verdict that in view of the judge's interpretation of the agreement, they found for the plaintiff, damages being assessed at £40.

Bristol Boys for the Dominions.

H.R.H. Prince Arthur of Connaught visited Bristol, England, on 9th May to open a commodious hostel in which forty boys are to be in residence for training for farm work in Australia and Canada. A nine to twelve weeks' training course is projected, so that 120 to 160 boys and youths will be sent out each year.

This scheme has been launched by the Bristol Migration Committee, which has the Lord Mayor at its head, and which, with the co-operation of the City Council, will be able to train the boys on the Corporation Farm of 300 acres. It has a herd of cattle ranging from 60 to 100, sheep, horses, a big herd of pigs, and about 800 poultry. The boys will be taught to adapt themselves generally to farm life.

In addition to the hostel the committee are using Cabot House—reminiscent of that Sebastian and John Cabot who sailed from Bristol to discover North America—and here the boys will learn carpentering, boot repairing, and clothes mending, and be generally taught to become handy men.

His Royal Highness, in opening the hostel, said:—

"It furnishes an example of what can be done by wholeheated co-operation between all sections of the community. I am glad to know that the hostel has been generously supported by the City Corporation and by the Government. From my personal knowledge of the Dominions, I am certain that they offer great opportunities to British boys. At the same time, it is vital that boys going to the Dominions should be tested and prepared for the new life they are to live out there. The testing and the training which will be given at this hostel will undoubtedly stand them in good stead.

"Just over 400 years ago the citizens of Bristol equipped Sebastian Cabot to sail from this port on a voyage which is famous even in your famous annals. They did better than they knew, for, though the voyage showed no commercial profit, it was the first practical step towards founding our Empire overseas. (Applause.) I believe Cabot took with him five cabin boys from this district—no doubt, boys of similar ages to those I see round me now—and it is, I think, specially appropriate that the Corporation and citizens of Bristol should follow up and consolidate that work by helping their young manhood to maintain the British stock and the British traditions in our great Dominions overseas. (Applause.) I know that these boys will be heartily welcomed there by their kith and kin. They are going to help in the creation of wealth from the fertile land of these new countries, and it is well that their fellow-citizens should see to it that they are properly equipped, as Cabot and his companions were, for the work that lies before them. I wish the boys every success. I would urge them to work hard and play the game, never forgetting their parents, their city, or their motherland." (Applause.)

The Haunts of Genius.

There is nowhere in the land any home so remote, so humble, that it may not contain the power of mind and heart and conscience to which nations yield and history submits its processes. Nature pays no tribute to aristocracy, subscribes to no creed or caste, renders fealty to no monarch or master of any name or kind. Genius is no snob. It does not run after titles or seek by preference the high circles of society. It affects humble company as well as great. It pays no special tribute to universities or learned societies or conventional standards of greatness, but serenely chooses its own comrades, its own haunts, its own cradle even, and its own life of adventure and of training.—The late President Wilson.

Britain's Best Customers.

Our best customers are our own fellow subjects, says the "Morning Post" (London). For example, out of exports valued at £723,000,000 last year the Empire absorbed £327,000,000, or 45.5 per cent., which is an increase of a third over the pre-war average. More than that, of our fully manufactured exports, the Empire now absorbs 50 per cent. Canada, dominated as she is by the proximity of the United States, last year bought from us goods to the value of £34,300,000—which is three-quarters of what the United States bought, though the population of Canada is to that of her mighty neighbour as one is to thirteen. Australia is a better customer than the Argentine, New Zealand than Denmark, and South Africa than Brazil. The population of Australia and New Zealand is, roughly, seven millions and a-half; yet last year those two Dominions bought from us greater value of goods than all South America, or all Central Europe, or France, Belgium, Italy, Spain, and Portugal together. Surely those are facts that are more material to our workers even than to our capitalists.

Cleanliness in the Dairy.

As the great majority of the defects of milk and dairy products arise through lack of cleanliness, it is well to recognise just what cleanliness involves. If the cleaning is to be effective, the dirt must not merely be completely removed, and the organisms present must not only be killed, but care must be taken that no fresh organisms are introduced.

The main object in cleaning is to get rid of the bacteria, and as these are usually embedded in the dirt, the first step is to remove it. In doing this the great majority of the organisms will be removed as well, while the few which remain will be prevented from multiplying owing to lack of nutrition. In order to remove the dirt, which in the case under discussion consists of the constituents of milk, it must be dissolved, and at least loosened by the use of hot water. The water should not, however, be used too warm to begin with, or the proteins will be rendered insoluble. By the use of soda the casein is dissolved, and the fat is emulsified. Soda also acts as a poison to bacteria. Lime is to be preferred for cleansing woodwork, because if scrubbed in it will remain for some time, so that its disinfecting action will be prolonged, and it will fill up the pores of the wood and render the surface smooth and firm. The cleaning process must always be finished by a thorough rinsing with plenty of hot water, either pure or containing one of the chemicals mentioned, or dissolved dirt will remain behind.

Tinned or other metal vessels or utensils should, if possible, be boiled or steamed as a final treatment, thus ensuring an extra sterilisation and rapid drying. If they are dipped it is absolutely essential that the water be actually boiling, and they should be immersed for three minutes if the process is to be thoroughly effective. The last point is very important, for in spite of all reasonable care absolute cleanliness and sterility are seldom achieved, but if only the vessels dry as soon as possible no new growth will develop in them. Wherever possible, the best use should be made of direct sunlight, which both dries and sterilises.

What has been said as applying to utensils, piping, &c., applies equally well to the cloths and scrubbing brushes used in cleaning. These must be thoroughly cleaned and finally scalded with boiling water and dried to prevent them becoming slimy. Every dairyman should clearly understand that cloths and brushes may do more harm than good if not perfectly clean.

It is well known that cleansing cannot be effective if the vessels have inaccessible corners or rough surfaces; frayed woodwork or rusty pails should therefore not be tolerated. To thoroughly clean woodwork it is as well to sometimes wash it with commercial formalin diluted with twenty to forty times its bulk of water.

Plenty of hot water is essential in the dairy, and in this connection the installation of an ordinary domestic bath heater can be strongly advocated.

The Function of Science.

The truth is that there never was a time when one man could know all that was known about his world, writes Dr. Charles Singer in the first number of "The Realist." In this respect our age is even as other ages were, and it is sheer illusion to suppose that it differs from them in this regard. Nor is the advance of science to be measured by the vast accumulation of observations, but by the degree to which these observations are brought under general laws. The function of science is to classify, which is to simplify and ultimately to unify. It is just by its success in unifying our conceptions that the state of a science must be judged.

Where are the Great Men?

Apart from mere contemporary celebrity, which may be a very transient affair, nothing is more hazardous than to nominate claimants to greatness. The people who make most noise in the world are seldom the people who get the permanent crown. Copernicus changes the whole thought of mankind about the universe and man's place in it, and goes his way like an unknown straggler from the stage. Shakespeare dies at Stratford without anyone suspecting that the very age would be known as his, and would owe its transcendent glory to him. And it is quite on the cards that when our posterity of 2029 look back to our days it will discover that we "entertained angels unawares" in poets, thinkers, scientists, whose greatness has to be seen in perspective before it can be recognised.—A. G. Gardiner, in the "Star" (London).

Care of Tomato Seedlings.

After tomato seedlings have reached about 1½ inches in height they should be thinned out in the rows to at least 1½ inches apart. This gives the plants ample room to develop sturdy roots and leaves, and prevents their growing too high. Thinning out also allows good circulation of air between the plants. All weeds should be removed during all stages of growth.

In the hot-bed, with its high humidity, there is always danger of late blight developing. This can be prevented by spraying with Bordeaux mixture. In the case of seedlings a very weak spray (1-1-20) is used, as a stronger mixture may injure the foliage at this young stage. Spray injury may also be caused by the spray having an acid reaction. This can be tested with blue litmus paper, and the defect can be corrected by adding more lime.

Next to blight, the most important disease to combat is spotted wilt. This disease has been proved to be due to the action of a parasitic virus. The infection is present in the sap of diseased plants, and is transferred to other plants by insects, such as thrips and aphides. Any diseased plants should be destroyed, and regular spraying with a nicotine solution is recommended to control the insects. Other contact killers, such as soap and kerosene emulsion, can also be used for this purpose.

Points in Handling Citrus Fruits.

It is not sufficient to grow good fruit—it must be so harvested, handled, and packed that it is still good when it reaches the consumer. The rot organisms that gain access through a broken skin quickly cause decomposition. Following are some precautions it will pay the citrus grower to keep in mind:—

1. Clipping of the fruit is advisable, but it must be carefully done so as not to leave a stem, which in the course of a few days dries and punctures the adjacent fruit.

2. Do not drop the fruit into the picking bag, but place it carefully, and pour it carefully from picking bags to boxes. A properly designed picking bag or "apron" should be used, which can be filled and emptied with the minimum of damage to the fruit. The boxes should be carefully examined, and all grit and protruding nails removed.

3. Do not jolt the fruit over rough roads.

4. Grade carefully for quality, and market in strict accordance with the grading regulations.

5. See that the sizing machine is working properly, and that none of the fruit is too tightly squeezed or jambed.

6. Use a good clean case.

7. Pack neatly and tightly and fairly high, thus ensuring a full case when the buyer receives it.

8. Stack cases on their sides.

No Shorter Hours for Leaders.

The higher men climb, the longer their working day. And any young man with a streak of idleness in him might better make up his mind at the beginning that mediocrity is to be his lot. Without immense, sustained effort he will not climb high. And even though fortune or chance were to lift him high he would not stay there. For to keep at the top is harder, almost, than to get there. There are no office hours for leaders.—Cardinal Gibbons.

Sheep Classing—Points for Small Flock Owners.

The grading of the breeding flock and selection of the sires for use in mating is a regular part of the practice on large properties. Better flocks mean bigger returns, and even the small flock owner is recommended to class his ewes at least to the extent of culling out all the low-grade animals.

The best time to class the flock is just prior to shearing, as the sheep are then carrying full evidence of their value as producers of wool. In flocks which are used primarily for fat-lamb production, size of frame, roominess in girth and hindquarters, good milk-producing qualities, and early maturity are points of importance, and all ewes lacking these qualities to any extent should be eliminated from the breeding flock. At the same time, these being days of good wool prices, the wool side must not be lost sight of, as a ewe can raise a satisfactory fat lamb and still produce a payable fleece of wool.

The small flock owner who is breeding for wool should have in view the sheep that will grow the type of wool most payable and best suited to the district, and in this connection he will find the views of those with longer local experience helpful. Having fixed a certain ideal in his mind he should strive each year when classing his sheep to bring the flock a little nearer to it by culling out all ewes that vary greatly in any of the essential qualities. The important qualities to consider are a well-shaped frame, considering the type and breed, good legs (not crooked), and wool of the desired quality (fineness) and as even and dense as possible all over the body. With regard to frame, shapeliness of carcase is not quite so important in the Merino as in the mutton breeds.

The most common faults are small, undersized, or weedy frame, a dip behind the shoulders called "devils grip" (a sign of weak constitution), narrow shoulders or hips, and crooked legs or feet. Common faults in the wool growth which should also be avoided are unevenness over the body, lack of density or length, and dulness or dinginess in colour due to too much condition or to an undesirable type of yolk.

As soon as the teeth become faulty it is as well to cull such sheep out on account of age. The class of country and the amount of risk the owner is prepared to run if a dry season follows will decide at what stage it is wise to cull for age—aged ewes, especially if in lamb, are naturally the first to feel the pinch under dry conditions.

Each year the ewe hoggets will come up for inspection, and here judgment is required. As many as one third of the ewe hoggets are culled each year on numbers of station properties. This keeps the flock at a high standard and allows for a percentage of the cull hoggets to be fairly attractive and worth good prices in the market as breeders.

The fact that the ewes are rearing lambs must be considered when classing; ewes with lambs at foot cannot be expected to be in the pink of condition, and should not be culled because of lack of condition alone. If hoggets have encountered severe conditions after being weaned they may not be well grown, and it may be advisable to hold them for a while before passing judgment. When ewes are culled for any reason except for age, a distinguishing mark should be put in the plain ear so that they can be easily recognised in the yards and on no account should they be bred from, as their faults are likely to be intensified in the progeny. The wisest plan is to try to fatten all the culls and dispose of them to the butcher at the earliest opportunity.

In a flock of comebacks, if breeding for wool, the procedure would be similar to that described, except that care should be taken that the size of frame necessary in a sheep of this type is not sacrificed to the production of a superfine class of wool. If the comeback flock is used for lamb-raising, the points mentioned earlier (roominess of frame, milk production and early maturity) need to be considered.

These remarks concerning frame and conformation apply also to a crossbred flock, but to a lesser degree. The main consideration in regard to the wool is to make the flock as even as possible; but because of the greater value attaching to the finer classes of crossbred wool, it is advisable to cull the coarser-woolled animals.—A. and P. Notes, N.S.W. Department of Agriculture.

The Home and the Garden.

OUR BABIES.

Under this heading a series of short articles by the Medical and Nursing Staff of the Queensland Baby Clinics, dealing with the welfare and care of babies, has been planned in the hope of increasing their health and happiness and decreasing the number of avoidable cases of infant mortality.

HOW TO KEEP BABY HEALTHY IN WINTER.

In the year 1927 there occurred in Queensland during the first year of life 111 deaths from respiratory infections, chiefly bronchitis and pneumonia. These deaths were preventable. Most, if not all, of them followed on a ''common cold.''

The number of births in Queensland every year is very nearly 20,000. Probably thousands of these babies suffer from ''common colds'' during the first year of life. Usually these ''colds'' are slight though troublesome ailments in babyhood, but in babies they are followed more frequently by serious or fatal complications than at other ages. What can be done to diminish the present mortality from this cause?

A "Common Cold" an Infectious Disease.

(1) A ''common cold'' is an infectious disease. The baby always gets it from some other person. Usually this other person is suffering from a ''cold,'' but not always. The infective germs may be present in persons who are apparently quite well. They are ''carriers'' of the disease. Or these persons may have been nursing or fondling some other child who has a cold and may carry the germs in their clothing. Obviously the more persons are allowed to handle, fondle, or kiss the baby the more likely he is to be infected. The baby with many relatives, more sentimental than wise, and the baby whose proud mother likes to hand him round to visitors for admiration runs extra risks. Taking a baby into a crowded room or hall, often unventilated—a picture show, for example—is a fairly sure method of insuring infection. No sensible, well-instructed mother, who loves her baby, would do such a thing.

While these sources of infection should certainly be avoided, there are others in which prevention is not so easy. The older children often catch ''colds'' at school, and it is not easy then to keep them away from the baby, but it should be done. The father also, when so suffering, should keep at a distance. But if the mother gets a ''cold,'' the baby's chance of escaping infection is much smaller. Therefore nursing mothers should be particularly careful not to catch ''colds'' from other people. Should they get one they should not kiss or cough over the baby. They should hold a handkerchief over their mouths when coughing, and carefully wash their infected hands before touching the baby. It would be a wise precaution to wear a gauze mask or tie a handkerchief over face and nose while suckling. There are some bad habits that actually force the germs which may be present in the mother's mouth into the baby's mouth—for instance, blowing on the baby's food to cool it, or tasting it from a cup or spoon, which is afterwards used by the baby. We have even seen mothers put the baby's dummy into their own mouths, and then into the mouths of their helpless babies.

A Kiss, a Cup, or a Cough may mean Death to the Baby.

(2) If a strong, healthy baby catches a ''cold'' it is not usually a serious matter. A healthy, breast-fed baby will probably shake off a ''cold'' more quickly than a healthy-looking, bottle-fed baby. A poorly-nourished baby finds it still more difficult to do this, and is more likely to develop complications. Therefore the mortality from respiratory infections would be less if all babies were breast-fed. Let every mother keep her baby as strong as possible. It is the weakly, undernourished, or new-born babe who most easily dies from a simple infection. The danger rises to its greatest height in premature babies, these frail beginnings of life. For them death may lurk in a kiss, a cup, a cough.

Prevention Better than Cure.

(3) A baby with a ''cold'' may not appear seriously ill, but he is not well. Take care of him. He may be a little feverish and thirsty; then give him plenty of boiled water to drink, but less milk or other food. Unless you do this he will probably

suffer from indigestion and loose motions. Let him have plenty of fresh air, but keep him sufficiently covered. Babies suffering from "colds" are susceptible to chills, which may bring on bronchitis or pneumonia. If he is not feverish he may be taken out into the sunshine, provided he is sufficiently clothed and not exposed to a cold wind. One complication of a "cold" is earache. Suspect this if the baby cries from pain and puts his hand up to his head. For earache, bronchitis, and pneumonia medical treatment is necessary; but prevention is far better.

KITCHEN GARDEN.

Nearly all spring and summer crops can now be planted. Here is a list of seeds and roots to be sown which will keep the market gardeners busy for some time: Carrots, parsnips, turnip, beet, lettuce, endive, salsify, radish, rhubarb, asparagus, Jerusalem artichoke, French beans, runner beans of all kinds, peas, parsley, tomato, egg-plant, sea-kale, cucumber, melon, pumpkin, globe artichokes. Set out any cabbage plants and kohl-rabi that are ready. Towards the end of the month plant out tomatoes, melons, cucumbers, &c., which have been raised under cover. Support peas by sticks or wire-netting. Pinch off the tops of broad beans as they come into flower to make the beans set. Plough or dig up old cauliflower and cabbage beds, and let them lie in the rough for a month before replanting, so that the soil may get the benefit of the sun and air. Top-dressing, where vegetables have been planted out with fine stable manure, has a most beneficial effect on their growth, as it furnishes a mulch as well as supplies of plant food.

FLOWERING SHRUBS.

Lagerstrœmia indica varieties.—There are many beautiful forms of this shrub on the market, and the finest varieties have been raised in Queensland—*L. Matthewsii* and *L. Earesiana;* the colours of both are lilac, but *Matthewsii* is the darker shade. The heads of bloom of both varieties attained a length of about 24 in., and the individual flowers are a couple of inches across. The plant may be grown in any small garden, and the size may be kept at the will of the gardener. Specimens growing in Brisbane range from a few feet high to 20 ft.

The plant stands severe trimming; in fact, it stands the knife so well that it can be grown almost any height by being cut back in July every year, like a grape vine. One of the finest specimens of *L. Matthewsii* can be seen growing on the river side of the Customs House garden. Plants are easily raised from cuttings taken from the previous year's wood and planted during July and August. Also plants well established may be purchased at any of the nurserymen's stores.

Gardenias.—In the earlier days of Brisbane there were few gardens without a gardenia; now they are rarely seen. *G. Thunbergii* is one of the varieties that should be grown. The flowers are pure white, exquisitely scented, and the foliage of all the varieties are a glossy green. These plants are not too fond of pruning, and should be allowed to grow in their own way. *Gardenia florida* is mostly grown for florists' use, the flowers being perfect in form and not having the heavy perfume of the other varieties. All the gardenia family are subject to scale diseases, but are easily kept clean by occasional sprayings with boiler water that has plenty of soap in solution. The plants never attain any size, so are very useful in small gardens.

Oleander.—In the northern part of the State these plants flourish, and are much admired by visitors from the Southern States and overseas.

The plants attain a fair size if not kept within bounds. In some of our northern towns it is quite common to see plants 20 to 30 ft. high, and of many colours. The plants are grown in Brisbane, but by a few only, yet they grow just as well here as in the North. The smaller growing varieties should be more extensively grown, and the pink "Carnea," white "Madonna," and carmine "Delphine" are all good old varieties.

When growing the plants in small gardens it is necessary from their earliest stages of growth to keep them well headed back, the young wood of the previous year being the flowering wood.

Lantana.—The small varieties of lantana are not in common with the pest scattered all over Queensland, and are very beautiful when trained as hedges or shrubs. The tangerine coloured variety and the canary yellow variety are the two usually grown in Southern Queensland. Splendid specimens of these are growing in the Botanic and Museum gardens. The plants flower for nine months of the year, and will grow in almost any soil and will stand fairly hard conditions.

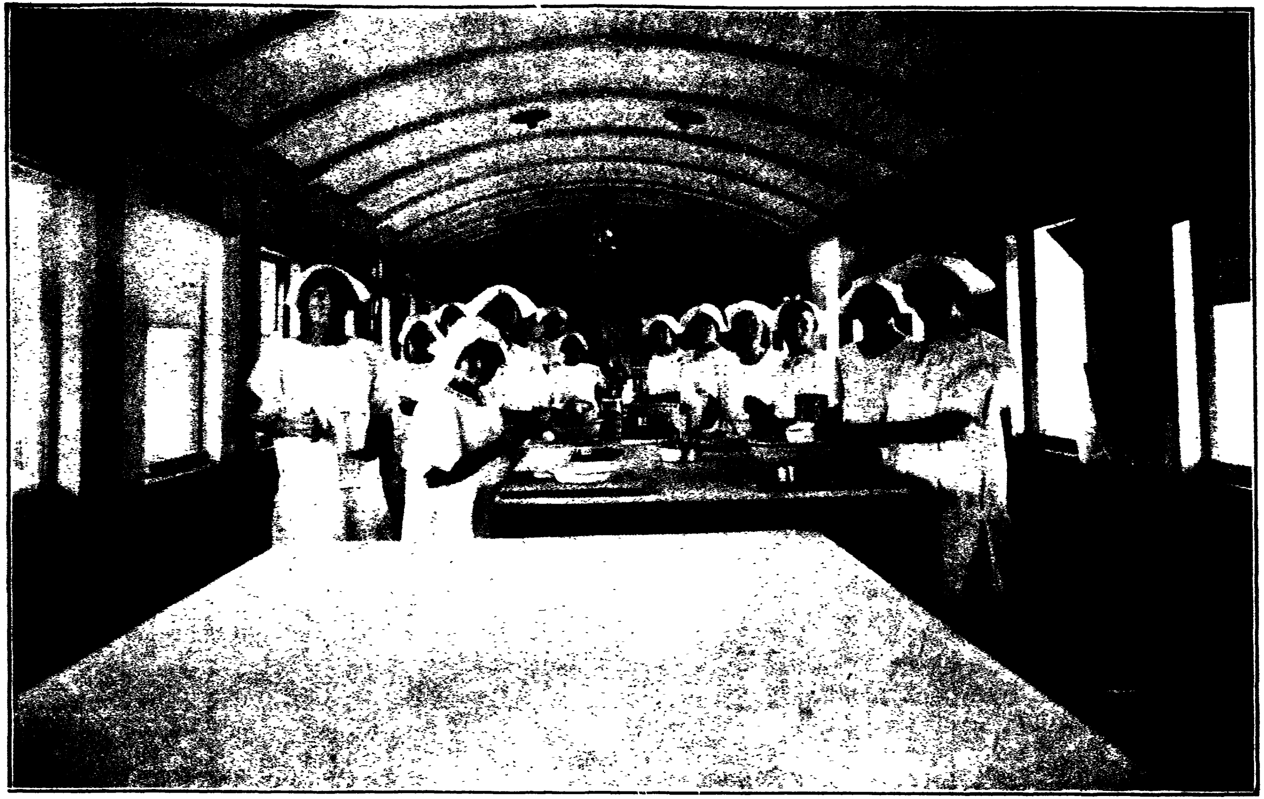


PLATE 41.—A COOKERY CLASS IN A TRAVELLING DOMESTIC SCIENCE SCHOOL.

To provide the advantages of vocational training to Queensland children in isolated centres far beyond the influence of Technical Colleges and Rural Schools, fully equipped schools on wheels have been constructed, and this is a typical interior.

Photo.: Dept. of Public Instruction.]

PLATE 42.—SWIMMING IS TAUGHT REGULARLY IN QUEENSLAND SCHOOLS BY EXPERT SWIMMERS.

This pool at a country school is a popular corner of the playground. Other baths, particularly in the cities, are far more elaborately constructed and appointed, but none could give greater enjoyment to these healthy young Queenslanders.

FLOWER GARDEN.

All the roses should have been pruned some time ago, but do not forget to look over them occasionally, and encourage them in the way they should go by rubbing off any shoots which tend to grow towards the centre. Where there is a fine young shoot growing in the right direction, cut off the old parent branch which it will replace. If this work is done gradually, it will save a great deal of hacking and sawing when next pruning season arrives. Trim and repair the lawns. Plant out antirrhinums (snapdragons), pansies, hollyhocks, verbenas, petunias, &c. Sow zinnias, amaranthus, balsam, chrysanthemum, marigolds, cosmos, coxcombs, phloxes, sweet peas, lupins; and plant gladiolus, tuberoses, amaryllis, pancratium, ismene, crinums, belladonna, lily, and other bulbs. In the case of dahlias, however, it will be better to place them in some warm, moist spot, where they will start gently and be ready to plant out in a month or two. It must be remembered that this is the driest of our months. During thirty-eight years the average number of rainy days in August was seven, and the mean average rainfall 2.63 in., and for September 2.07, increasing gradually to a rainfall of 7.69 in. in February.

LANDSCAPE GARDENING.

The landscape gardener must possess a good deal of artistic taste, as he deals with the landscape and its improvement. Should alterations be necessary, they must be carried out in as natural a manner as possible, and they must be in unison with the surrounding country. Any existing natural features may be made the most of.

If trees shut out a desirable view, they may with care be removed. Tree thinning also becomes necessary when some are spoiling others. It is better to have one good specimen than several poor ones. When tree planting, the gardener must look forward, and consider their size when maturity is reached.

Broad stretches of lawn may be broken up with shrubs or specimen trees, or beds of flowers. The character of the soil and the situation must be taken into consideration when planting. It is of no use to plant trees or shrubs that are not likely to succeed, and if doubtful ones are included they must be in positions where they can be easily replaced should they fail. The character of the dwelling must also be taken into consideration.

Vista making is an important part of landscape gardening, and to carry it out the various points of vantage have to be ascertained and their values determined. The outline of the landscape from the various vantage points must be undulating, not straight or unbroken, and though special hues in greenery may be made the most of, they must not be repeated until the eye wearies of them.

Paths should be as few as possible, and each should be made for some definite purpose. They should run in bold but graceful curves, especially when made of gravel.

If summer houses are included they should not stand out aggressively, and they should be covered with creepers as quickly as possible.

TRANSPLANTING FRUIT TREES.

The transplanting of partially developed fruit trees is seldom attempted on account of the risk of failure and the trouble entailed in endeavouring to retain sufficient fibrous roots to ensure a reasonable prospect of success. Trees up to five or six years old, where subject to the necessary preliminary treatment, can not only be removed without risk of failure, but transported satisfactorily over long distances. It will be recognised that the sustenance of the plant is absorbed by the small or fibrous roots in the immediate vicinity of their terminals, and by inducing a profusion of these within a short radius of the stem the chances of failure are practically nil. A profusion of small roots may be ensured by cutting through at the desired distance from the stem (15 to 24 inches, according to the size of the tree) all roots to a depth of 18 inches. In so doing a trench is made around the tree, and the ends of roots carefully pared if the cutting has not been "clean." The trench is then refilled with soil containing a good supply of humus, and in about three months' time the original root ends will have developed a good supply of fibres. At the time of removal these are not interfered with more than can be avoided, the necessary excavation for removing the tree from its original position and severance of any lower roots being made beyond the terminals of the young root growth. The head of a large tree should be materially shortened at the time of removal. The cutting of roots in the first instance should be performed when the tree is in a dormant state; in the case of citrus, conditions are generally favourable about March. Tropical varieties handled in this manner can be removed at almost any time after sufficient roots have formed and hardened, and may be first treated at any time of the year at the period known as "between growths."—GEO. WILLIAMS, Director of Fruit Culture.

TWELVE BEST GARDEN ROSES.

(Continued from the June Journal.)

Following is the continuation (abridged) and conclusion of the paper read by Mr. B. Watkins, M.Sc., president of the Horticultural Society of Queensland, before a recent meeting of that body:—

The Maman Cochet.

In a review of this kind it would be unkind to omit to mention that once famous and even now popular tea rose, Maman Cochet, which appeared in 1893. It constituted a milestone in rose progress in its day, and was looked upon as an epoch-making variety. Its ability to grow and flower under the most adverse conditions without care or cultivation is a strong point in its favour; in fact, too much attention results in coarse, double-centred blooms. Left to itself, it produces blooms of ideal exhibition form of a deep flesh colour with a suffusion of light rose.

I venture to say there is no variety to-day with more first prizes to its credit than this rose. It still continues a prominent variety on the show tables, together with the white sport of later date. Occasionally, owing to its thin petals, it does not open well. The climber is an exceptionally vigorous grower, and abundantly free in bloom.

Pink Varieties.

Among the vigorous pink varieties there is one more rose of distinction, Countess of Gosford, a beautiful salmon, practically the first rose sent out by the now well-known firm of S. McGredy (1906). This is a variety not grown by everyone, but it merits this distinction. Had it a few more petals, resulting in a little more fulness, and consequently increased lasting powers, it would be in universal demand. Nevertheless, owing to its free and continuous blooming propensities, its strong, branching growth, and disease-resistant powers, it can be strongly recommended. If one can catch it at the right moment it is valuable for exhibition purposes, but owing to its rapid opening it usually disappoints the exhibitor. A fine bud in the morning is a full-blown rose by evening, even if gathered and put in water. As a decorative bush for the garden it is excellent. Further, it is the most satisfactory rose to grow as a standard in Brisbane. This type of rose is not considered to be a success here, but to those who desire a really good rose on a standard stock I recommend this variety. It makes a wonderful head, bushy and symmetrically round, and blooms just as well in this form as in the dwarf form.

The pink varieties already discussed are vigorous growers suitable for back row positions, but there are several meritorious pinks which demand attention, though not such tall growers as those already discussed. I call to mind the following: —Ethel Somerset, the best of these; Madam Butterfly and her sports; Madam Jules Grolez; Mrs. Bryce Allen; Una Wallace; Rose Marie; and Madam Segond Weber.

In concluding the review of the pink varieties, I should like to bring before you the claims of a rose which I have often exhibited here with success. This rose is Priscilla, a deep pink of faultless exhibition shape, and is known to a few of our members. It was sent to me for certain tests by Hazlewood Bros., but is considered by that well-known firm to blue so badly as to remain unlisted. Whatever may be its tendency to blue under southern conditions, the same does not seriously affect it here, and I make bold in saying that were it known here it would be in everyone's garden, and one of the chosen twelve. However, I do not intend to elevate it to that distinction at present.

Yellows and Apricot Shades.

The third colour class to discuss are the yellows and apricot shades. There is no deficiency of roses in this colour class, but there is a deficiency of really good garden yellows for Brisbane conditions. The greatest fault to be found with this class is the tendency to fade, and in fading to spoil and turn dirty. A yellow rose which fades evenly is not so bad, but when such roses blotch and become dirty in patches they are far from æsthetic. We have had many yellows in past times, it being a common enough colour among tea roses. Madam Constant Soupert (peach and yellow), Lady Plymouth, Alexander Hill Grey, Lady Hillingdon, are all yellow teas which have some or other serious fault. The first three ball badly and bleach unevenly. The last, Lady Hillingdon, an exceedingly popular rose, must give way to others. Its greatest fault is that it hangs its head, and although reluctant to see it displaced, I am of the opinion that it is.

There is no question that the premier yellow to date is Souvenir de H. A. Verschuren, which appeared in 1922. It is related to the popular Sunburst, but is a far better rose. I secured it as a novelty, and the identical plant is still a wonder. Colour is deep cadmium yellow passing to lighter shade in outer petals. Fine form, fine perfume, upright growth, disease-resistant properties, and blooms carried on long stems above solid green foliage combine to give us a rose of great merit. It is a particularly free flowerer, and the flowers have solid petals, and last a long time. Just as I do not hesitate about the premier place among the yellows, so too I do not hesitate about second place. In my opinion this belongs to Elegante. This rose appeared in 1918 from the nursery of Pernet Ducher. In colour it is not as deep as Verschuren, being nearer to a clear light yellow self, but it has this advantage—that it fades evenly, and holds its charm in spite of a slight petal deficiency. It is always growing, always in bud and flower. The buds are very long, and when opening give a perfect high-pointed well-formed flower. It is vigorous and disease resistant. I recommend this variety to those who have not grown it.

PLATE 43.—A COUNTRY HOME IN QUEENSLAND.

Dr. J. H. Dalrymple's bungalow, "Homefield," on the Nebo Road, Mackay.

One of the brightest scenes in a district noted for natural beauty is this comfortable home on the outskirts of Mackay. Roofed with green shingles with appropriately toned outlines, standing well back from the roadway, and set in velvety lawns backed with fields of sugar-cane, it represents a type of farm home that we hope to see more common in Queensland. Though complete with every modern convenience, it is yet well within the financial reach of the farmer. Its interior is replete with the latest labour-saving "gadgets," and its design and general layout shows what can be accomplished in the making of a comparatively inexpensive modern country home. Beef cattle and cane are the owner's main interests.

The third rose of note in this section is Mrs. Dunlop Best, a reddish apricot to yellow variety, which, owing to great freedom in growth and bloom disease resistance, makes a valuable garden rose, particularly in a colour class deficient in numbers. This is easily the best rose in its class, and although it is not as full as one would wish, yet the constant blooming ability of this variety assures the grower that he will always have a supply of roses. The above three roses represent the best in each grade of yellow.

In reviewing the remainder one finds that exquisitely coloured and perfectly shaped gem, Rev. F. Page Roberts, which takes all by storm. Had it a little more vigour and less tendency to die back it would sweep all before it. I would advise those who grow it to refrain from pruning, and let the cutting of the flowers be all the pruning it gets, also to give it a well-balanced fertiliser, making sure that potash is not lacking. Even wood which appears old and spent has the habit of sending out vigorous growth in an unexpected manner. So I say let well alone and you may succeed with it. Strange to say, this variety shows more brilliant colouring in full summer than winter. The rich deep copper of the outside of the petal contrasts in an amazing manner with the fine deep yellow inside. Finally, as to yellows, Souvenir de Madam Boullet, from the nursery of Pernet Ducher, in 1921, will very soon occupy a high position with rose growers. It is certainly an improved Hillingdon in shape and carriage and colour, and if its growth continues good, then it will outclass its rival. I am very impressed by this variety.

I do not think it is too early to predict that the most popular yellow rose a few years hence has arrived amongst us in the Golden Dawn. If such proves to be the case, then Mr. P. Grant, of New South Wales rose-growing fame, will have reason to be proud, and Australian rose-growers will do likewise. Mr. Grant has not withheld the pedigree of his new rose. It is a seedling raised from Elegante and Ethel Somerset. I have already spoken in favourable terms of both these roses, and the progeny is said to combine the virtues to each, to be vigorous, with clean, distinctive foliage and splendid branching habit, so essential to free and continuous blooming. The colour is described as rich sun-yellow, heavily flushed deep old rose.

Lighter Shades and Whites.

There is one colour class remaining to be discussed, the light shades and whites. I am not partial towards whites nor light shades, yet I promised to treat each variety on its merits, and consider the following are worthy of attention:—Mrs. Herbert Stevens, Frau Karl Druschki, White Maman Cochet, W. R. Smith, Mrs. Harold Brocklebank, White Ensign, Antoine Revoire, Madam Jules Bouche, K. A. Victoria. Of the above list the best known are Frau Karl Druschki, Mrs. Herbert Stevens, and White Maman Cochet. The first two deserve a place in any plebiscite, and White Maman Cochet, though subject to discoloration and at times coarseness, maintains a high position among rose growers. It is even more vigorous than Maman Cochet, from which it is sported. The climbing form of White Maman Cochet is the most vigorous rose among climbers, and a particularly free flowerer.

Frau Karl Druschki is one of the best known roses in existence. It was sent out in 1900 by Lambert. The story goes that it was rescued from the garbage heap during the annual clean-up of nursery seedlings. Whether such is the case or otherwise, the fact remains that it is grown by everyone, and is a variety which is not over particular as to attention. It has the hybrid perpetual type of growth, sending out long, vigorous canes which need to be tied down to a horizontal position or cut back somewhat. It is the second growth from these canes which develops the flowers, and it is, when once established, a very free bloomer, giving large, pure white, faultless blooms of exceptional exhibition quality. Although it is usually considered to be a hybrid perpetual rose, some authorities consider it among the hybrid teas, owing to its great freedom in flower. It has two drawbacks: It is scentless, and it opens rather rapidly. Yet its virtues are such that it commands well-earned attention on all sides.

Mrs. Herbert Stevens, a tea rose sent out in 1910 by McGreedy, is the most popular white commercial variety to-day. It gives a superabundance of very well fashioned white blooms, with a faint perfume. It is especially free in bloom, every shoot carrying many buds, so judicious disbudding must be followed if exhibition quality is desired. Where such a practice is followed there results a great increase in size and substance, and the blooms are frequently shown on our tables. It has, however, a deficiency of petalage, and thus opens rather rapidly under ordinary garden conditions.

A climbing form is gaining in popularity, and eclipses that once-favoured climbing Niphetos of bygone gardens. Claimed as an improvement upon Mrs. Herbert Stevens, and sent out by the same firm in 1925, is the variety White Ensign. This claim remains in the testing period just now, but one local nurseryman and commercial grower prefers it to its rival, as it is a better bouquet variety, being fuller and lasting longer. I know specimen bushes of White Ensign which are all that could be desired, and my own plant improves month by month. At first it was small in shape and crowded in petalage, but marked improvement is now apparent. The colour in the centre is not white, but more of a lemon yellow.

W. R. Smith and Mrs. Harold Brocklebank always impress in a garden by reason of their powerful solid growth, thick disease-resistant foliage, and freedom in bloom, though each is deficient in perfume. The former, though a remarkably good rose, has a very serious fault, in that its spring blooms are always crippled, coarse, and discoloured, and have no value whatever. It is seen at its best during the autumn, when it shows up to a wonderful degree with its light-coloured, well-formed, somewhat globular blooms, the outer petals of which carry a delicate blush-pink colour. I cannot urge its claims overmuch, as I consider its behaviour outside the autumn to constitute a serious drawback.

Mrs. Harold Brocklebank, on the other hand, is a consistently good bloomer, giving shapely light-straw, yellow, and pink suffused blossoms continuously, which can claim attention from an exhibition standpoint. It is a very favoured rose in the South, and one which Brisbane growers who like the lighter shades cannot omit. Last of the above colour class is Antoine Revoire and Madam Jules Bouche. The former is a rose which finds many adherents, and appears in the bud to full bloom class on many show occasions. The colour of this rose is exquisite, and as a good bush yields a creditable number of blooms, it is a fine garden rose. It opens out rather flat, but, in spite of this, does not lack charm. It is mildew resistant and upright in growth, though, at times, it disappoints one in this latter direction. It is an old rose, having appeared in 1896 from the nursery of Pernet Ducher, and can justly claim a warm place in the affections of rose growers, for it has been utilised in the production of many favourite roses of to-day—namely, Columbia, Pilgrim, Ophelia, Madam Butterfly, Golden Ophelia.

Madam Jules Bouche, a delightfully shaped, dainty rose of creamy white, suffused pink, is a very consistent bloomer, and a garden decoration at all times. It is of a strong branching habit, and sends up abundant stems from the ground, carrying heaps of characteristic blooms. The characteristic exclamation of people seeing this rose for the first time is, "How dainty!" and this fits the bill perfectly. I would not put it among the premier garden roses, but it is good.

This brings us to the end of our review, and it remains for me to give my lists in order of merit.

First twelve.—Etoile de Holland, Radiance, Red Radiance, Jonkeer, J. L. Mock, Madam Abel Chatenay, Mrs. C. J. Bell, Hadley, Souvenir de H. A. Verschuren, Elegante, Mrs. Herbert Stevens, Frau Karl Druschki, Countess of Gosford.

Second twelve.—Laurent Carle, Lord Charlemont, Star of Queensland, Ethel Somerset, Madam Jules Grolez, Columbia, Maman Cochet, Antoine Revoire, White Maman Cochet, Mrs. Harold Brocklebank, Una Wallace, Priscilla.

NOTES ON ROSE PLANTING.

To be a successful grower of roses it is essential to have some knowledge of pruning before planting. Much depends on the planting and pruning to obtain the best blooms.

It is necessary to prune both branches and roots before planting, and if this is not carried out carefully the best results can never be obtained. Some of the suppliers of stock send their plants pruned and ready for direct planting.

In all cases the ground should be well trenched and put into condition before the operations of planting. It is useless attempting to grow roses for the best result unless the work of trenching has been done in a thorough manner, and well-rotted manure has been worked into the ground. The ground must be thoroughly drained so that no stagnant water is allowed to accumulate.

Before the plants arrive from the nursery prepare the place for each variety. Do not mix the varieties. Some are slow growers; others are rampant growers; and it requires consideration in selecting places for the various roses. A general rule is to put the strong growers at the back of a bed and the weaker ones in the front.

The following suggestions may be useful for those who are not well versed in the art of growing roses:—

In the first place, see that you have your beds in the most open and sunny position possible. Rose plants must have space to develop; therefore plenty of room must be allowed for each plant. Many of the diseases of roses can be put down to insufficient sunlight, air, and space, rather than to cultivation faults.

As some roses require skilled treatment and cultivation, beginners, when making their selection of rose plants, should choose those which are easy to grow and which flower well. Tea roses stand ordinary garden cultivation better than any other class of rose.

Any time from now to the end of July is suitable for rose planting, but the earlier they are planted the better. The distance apart is the main consideration. Many growers never allow their rose plants to develop, and keep them on the stunted side. This is all right for the rose exhibitor but no good for the grower of decorative flowers or garden decoration.

In our climate most rose bushes grow into large plants, and such growth encourages greater wealth of flowering wood and consequently more flowers. To do this, the rose plants must not be less than 6 feet apart. Any nearer would be considered close planting, and under such conditions one must cut the heads off plants to keep them within bounds.

If quality and quantity are desired, room must be allowed the plants for root expansion. When planting, always have the union a little below ground, and I would advise 2 inches as a necessary depth under the ground. The advantage of planting the union below the ground is that new roots form from the union, and eventually these roots do all the sustaining of the plant.

Another advantage is that in the early stages of growth the plant has the use of two sets of roots on the one plant. Eventually the brier root dies out, and there is no chance of brier suckers appearing in later years.

In the bottom of the hole to receive the new plants make a small hillock for the even spreading of the roots, which will be with root terminals all down instead of flat or turned towards the surface. Long roots may be carefully cut to suit the size of the hole.

Make the soil firm around the base of the plant, spread soil slightly over the smaller roots, and fill in gradually. Trample firmly, and thoroughly water the plant before finally filling in the whole of the soil. When water has soaked away the balance of the soil can be filled in. No further watering will be necessary for a week.

All that is then required is to keep the ground well hoed. Water every other week, giving a good soaking at each watering.

VALUE OF EARTH WORMS.

It is evident that not every gardener can decide whether the common earth worm is a friend or foe. Who has not seen the gardener, when digging, industriously remove every worm found?

Now, speaking generally, these creatures are more friends than otherwise, although they are far too numerous in some gardens at certain periods of the year. As a rule, they do more good than harm by allowing water and air to pass through the soil more freely, and in other small ways assist the gardener.

They may do a little harm by working among the roots of seedlings, also, of course, on lawns, bowling and golf greens, where they may be regarded as pests, rendering the use of lime water necessary to eradicate them.

Slugs and Snails.

Slugs and snails are troublesome in many gardens—in some more so than in others, and if they are not dealt with in some way a good deal of damage may be done during the year.

The value of lime and soot is pretty well known, but both must be used carefully, or the plants it is intended to protect may be damaged. Ashes in a dry state are also effective in keeping them off. In using these insecticides they must be used in lines or around the plants in a dry, powdery form.

If the garden soil is regularly limed and kept sweet there is less chance of the slug increasing. Watering with alum water is also death to snails and slugs.

PROPAGATION BY CUTTINGS AND LEAVES.

The herbaceous character and free-growing nature of the majority of plants that are used for summer bedding renders their propagation easy. Large numbers of plants are required in as short a time as possible, and without the expenditure of much time or labour, and unless a plant is easily propagated it is of little value in the bedding department.

Autumn propagation is preferred for the more robust of these plants, cuttings at that time being both plentiful and vigorous and the season favourable for the quick production of roots. If the necessary preparation of beds, boxes, and soil has been attended to, the whole of the cuttings may be put in during autumn and rooted before the cold weather comes. It may be laid down as a general rule that all stout, free-growing cuttings prefer a strong loamy soil, while those of a more delicate nature and that have fewer roots are safest when planted in light sandy soil containing a large proportion of leaf mould.

The cuttings should be planted firmly, in rows about 6 inches apart, and should receive a good watering as soon as planted, after which they will require little attention beyond the removal of dead leaves and a sprinkling of water overhead should the weather be dry. As soon as rooted, or at least before the approach of the cold, wet weather, they should be placed in boxes, pans, or pots, in which they are to winter. For smaller quantities it will be found best to plant the cuttings in shallow boxes, in which they may be allowed to remain until the spring.

Pentstemons, phloxes, pinks, antirrhinums, and a host of other bedding plants of robust constitution may be increased in the autumn in this way. Boxes are most convenient for these purposes. The bottom should be pierced with several holes an inch or more in diameter, and covered with an inch of ashes or crocks as drainage, the box being then filled with sandy soil, using loam, leaf mould, or whatever mixture the nature of the cuttings would require.

Under certain conditions buds are formed on the leaves of a large number of plants, such buds being called adventitious, to distinguish them from the stem or normal buds, which are found on all plants, and which are borne in the axils of the leaves. It is supposed that the leaves of a very large proportion of plants possess this power to develop extraordinary buds, and that their failing to do so when tested by the gardener is due to improper treatment rather than to absolute impotence in the leaf itself.

It is, however, only in a few cases that leaf-cuttings are resorted to for purposes of propagation. Such plants as begonias, gloxinias, and a few others of more or less succulent nature are the only ones for the increase of which leaf-cuttings are employed. Numerous other plants have proved capable of propagation by this means, some of them being not at all succulent-leaved, while on the other hand, plants of excessive succulence have proved unable to form buds when tested in the same way. In some cases where leaf-cuttings have been tried, roots were freely developed but no bud was formed. Camellias may be mentioned as plants whose leaves root freely but do not develop buds, although left in the propagating house for several years.

Where it is desirable that a new plant should be propagated as abundantly and as rapidly as possible, it will be found often advantageous to place the leaves that are removed from stem cuttings in the propagating frame and treat as advised below. To anyone acquainted with the nature of the following list of plants, it will be apparent that no rule can be laid down for the guidance of the cultivator, either when based on the texture of the leaves or the nature of the plants. Begonias, clianthus, gesnera, gloxinia, hoya, lilium, watercress, and many others may be propagated by means of leaves or portions of leaves.

Turning now to the plants that are usually increased from cuttings made of leaves, a word may be said on the treatment such leaves require, and the best time of the year for the operation. Gloxinias may be dealt with all times of the year when leaves are available, the most favourable period being autumn. Well-matured leaves should be selected, avoiding those in which the yellowness of decay has appeared. The leaf-stalk may be severed at any point, it being unnecessary to secure them with heel or portion of the stem. The blade may then be divided longitudinally, so that a large leaf would form about half a dozen cuttings. It is, however, better when the blade is cut into sections, each section having a portion of the midrib attached to its base.

Some prefer severing the midrib into about a dozen pieces, leaving the blade intact. In this way a plant is obtained from each portion of the midrib, bulbils being developed on the lower end of each. Where the latter plan is adopted the whole leaf must be pegged on to a pan of sandy soil. If the leaf is divided up into smaller pieces, pots may be used, filling the pots half-full of drainage, and the other half with a light sandy soil. Into this the cuttings must be placed obliquely, so that whilst held firmly in the soil their bases are only a little below the surface. A frame in a propagating house will be the most suitable place for the cuttings till rooted. In a small bush-house a position on a shelf would answer equally well for gloxinia cuttings.

Begonias may be treated as suggested for gloxinias; or, if to be propagated on a large scale, a frame containing cocoanut fibre may be used, pegging the begonia leaves on to the fibre.

Reference may be made to the reproductive nature of some fern fronds, especially the aspleniums, nephrodiums, aspidiums, the fronds of which usually bear buds, which eventually form plants. The requirements of such leaves, when wanted for propagating purposes, are very much the same as those of the plants themselves.

The scales which form lilium bulbs may be used for propagation, as if fresh when gathered and placed in sandy soil they root and form small bulbs capable of growing into large plants.

All these exceptional ways of obtaining a stock of plants are only resorted to in exceptional cases; they are chiefly of physiological interest, showing as they do how nature has provided plants with auxiliary powers for their reproduction, which are held in reserve till called upon by the failure of the normal proper means to fulfil the functions of increase or reproduction.

HORTICULTURE IN THE SOUTH.

The following notes have been extracted from a letter from Mr. J. F. Bailey, Director of the Adelaide Botanic Gardens, who was formerly on the staff of the Queensland Department of Agriculture and Stock as Curator of the Brisbane Botanic Gardens:—

Our dahlia display is almost expended, and, as usual, attracted thousands of visitors. Further proof has been given that either for garden decoration or for the show tables the type termed "decorative" outdistances those of any other class. We, of course, had representatives of all the classes, and the dainty collarettes had hosts of admirers.

Several slight variations have recently crept in among the two types of decorative we standardised here for guidance in the framing of show schedules. We thought, therefore, it advisable to reclassify them; and at a meeting recently held, at which were representatives of six societies, definitions to suit the respective types were drawn up. These will be placed before the members of the societies concerned, and when finalised I hope to send you particulars. Without such a guide it is very difficult for judges to make correct class awards.

Some of our local growers have raised excellent seedlings quite equal to many of the high-priced varieties from overseas. Our nurserymen who specialise in this flower are alive to its importance, and keep up to date with the latest American and European novelties as well as those to be obtained within the Commonwealth. I frequently receive inquiries as to the names of a "few" good decorative varieties, and find it difficult to keep down such a list, there being so many of equal merit.

While a good percentage of our recent importations upheld their catalogue descriptions, some of those obtained at a high price were inferior to many of our local seedlings. As some of your friends may like to know the names of those which attracted attention a list is given. Among those new to our collection to deserve mention were:—

Charles Stratton, gold, shaded rose; Renown, purplish maroon, a variety that holds well; Mordella, apricot buff, suffused pink; Grace Curling, lilac pink; Couronne d'Or, colour as suggested by name; King Tut, crimson; Zante, deep gold; Jersey Beacon, scarlet; Bockenhage, pink, with orange centre; Robert Treat, rosy red; Elinor Vandeveer, pink; Leviathan, orange; Emma Groot, rosy mauve; J. L. Crowther, buff apricot; Rookwood, deep mauve; Pinkie, a garden variety, with medium-sized blooms, excellent for cutting; Rapallo, a garden variety with blooms of a striking colour, crimson-bordered yellow; Border Perfection, a dwarf grower producing large blooms of a dark red colour. A bloom of this gained championship honours at one of the local shows.

The following varieties in the collection last year maintained their good qualities during the past season:—Mrs. C. G. Hood, bright rose, some excellent seedlings of which have been raised from this by the local growers who favour it as a parent; H. D. Cartwright, orange, which followed up its last year's successes at the shows; Sheila Ward, yellow, tipped white; Beau Brummell, royal purple; Evelyn Winter, white; Earl Williams, crimson, tipped white; Shudow's lavender; Porthos, violet purple; Bordeaux, red; Berengaria, gold; Cadiz, orange and chrome yellow, a most profuse bloomer; Ivy de ver Warner, pink; Jersey Beauty, pink; Mabel Lawrence, crimson scarlet; Kitty Dunlap, rosy mauve; Katherine, mulberry; Mrs. Carl Salbach, pink; Amun Ra, copper and gold; Golden Fleece; and Lady Stonehaven, an Australian-raised variety, quite the best yellow either for show or garden.

During the last three weeks we have had a glorious show of chrysanthemums, and a couple of beds of Lilian Bird have been a great sight. This is a pink variety that is grown extensively for the market here, and there is nothing more dainty for vase work.

This has been the driest season on record, but as we have a good water supply there are no restrictions placed on its use. Lately we have had wintry conditions with touches of frost, and salvias, bedding begonias, amaranthus, iresines, and the like have not been able to stand it.

Orchard Notes for August.

THE COASTAL DISTRICTS.

The bulk of citrus fruits, with the exception of late ripening varieties, will now have been marketed, and cultural operations, pruning, spraying, &c., should be receiving attention. Where trees show indication of impaired vigour, pruning should be heavy, both in respect of thinning and shortening branches. Where trees are vigorous and healthy a light thinning only will be necessary, except in the case of the Glen Retreat Mandarin which in coastal lands is invariably disposed to produce a profusion of branches with consequent overproduction and weakening of the constitution of the tree in addition to the fruit being small and not of the best quality. Where white louse is present on the main stem (where it almost invariably makes its first appearance) or branches, spraying with lime sulphur solution in the proportion of one part of the concentrate to ten parts of water after the centre of the tree has been opened up by pruning will be found most beneficial.

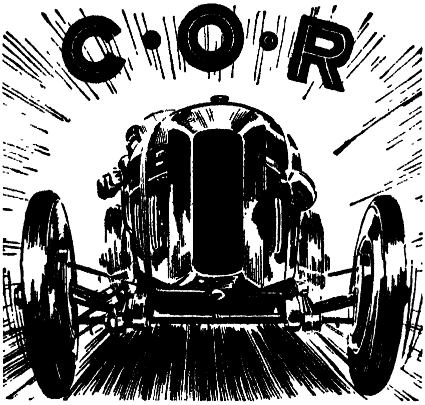
In dealing with trees which show signs of failing, investigation should be made near the ground level for indications of collar rot and in the North Coast district particularly, for the presence of the weevil root-borer which may attack the roots in the vicinity of the thin bases or at some feet distant. A very light application of paradichlor. buried a few inches under the soil in circles around the tree and the surface tamped firm is considered efficacious in destroying the pest. The distance between the circles (shallow openings connected throughout) should not be more than 18 inches. It may be necessary to repeat the application at three to four weeks' intervals.

Spraying with Bordeaux mixture is desirable as it will, if properly applied, destroy the spores of various fungi later attacking both foliage and fruit.

Where for any reason healthy trees of vigorous constitution are unprofitable they should now be headed back, in fact, the whole of the top removed, leaving only a few selected "arms" of previous branches, all other branches being cut clean away at their base. Three or four main arms, whose length will vary from 2 to 4 ft. according to the size of the tree, will form the future head of the tree and from these numerous shoots will originate; these shoots in turn are reduced according to circumstances, usually from two to five on each arm, and given fair attention they will be in a fit condition to receive selected buds from a prolific tree by next autumn. It is advisable when the shoots intended for budding have attained a length of about 6 inches to nip off their terminals for the purpose of stiffening their growth, otherwise they are liable to be blown off by winds. All branches or parts removed in pruning should be carefully collected and burned. Applications against pests and disease could hardly be satisfactory if the material for re-infestation is available throughout the orchard.

Working the land is essential and disc implements give best results. Before ploughing it is advisable to apply the necessary fertiliser. not just around the trees beneath their branches, but over the whole orchard, the feeding roots mainly extending beyond the extremities of the branches. The depth to which ploughing should be effected will depend on the nature of the soil and its original preparation. Where the subsoil is of a permeable nature, or has been broken up in the first instance, ploughing could be much deeper than on land where due consideration had not been given to this practice. It will also be noted that among some of our light loams that fertility is confined to a shallow depth, where it would be futile to persist in deep ploughing to force the roots into a subsoil from which they could derive but little sustenance. Following upon ploughing, the soil should be further treated until finely broken, the implement necessary will depend upon the constituency of the soil. Generally a good harrow will meet all requirements. On the completion of ploughing between rows an open furrow should not be left on the border or margin, but two or three furrows should be turned back to fill this and the whole then worked sufficiently to leave an even surface throughout the orchard. Except for the purpose of turning in fertiliser or green manure, a good type of disc cultivator can be substituted for the plough and will give at least an equal result.

The planting of trees may be continued and with the exception of custard apples (which should be left until the end of August) should be expedited. The planting of citrus trees this season has been inextensive, but there is a much better outlook for orange production than has been previously offered, and attention should be confined mainly to good varieties of this class—viz., Jaffa and Siletta with a lesser quantity of late Valencia. The preserving of orange juice will very materially assist in the absorption of our crop, and the fact that the trees develop much more rapidly in this State than in Southern producing regions is distinctly in our favour, also our fruit contains a much higher sugar content. This, however, is not to be accepted as an invitation to continue the practice of sending immature fruit to the Southern markets.



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Grape vines should be pruned, and where cuttings for planting are required these should be selected, trimmed, and heeled in slightly damp soil. Canes intended for cuttings should not be allowed to lay about and dry out, but treated the day they are severed from the plant. Cuttings are frequently made of excessive length. Ten to twelve inches is a fair length, allowing for insertion in the soil to admit of the top bud with a short section of the internode to protrude. Growth is only desired from the upper or exposed bud.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

All pruning other than that applied to peaches and varieties which are late in coming into growth should be completed this month and the planting of young trees, if not already done, should no longer be delayed. Early planting is preferred, the sooner after the fall of leaves the better. The time is opportune (when there is indication of the buds swelling) to work over (where the stock is reasonably vigorous) unprofitable trees. Strap grafting, as advised by the local field officers, is the most satisfactory method of top-working deciduous trees.

The pruning of vines should be postponed as long as circumstances permit, and these can only be gauged on actual observation as they are subject to much variation.

Late spraying against San José scale where present should be applied with an efficient oil emulsion before any growth appears. Each particular brand has its advocates. Where the scale is persistent, a 2 per cent. solution of Volck may be applied subsequent to the appearance of foliage. Both of these sprays are efficacious against peach or other aphis, at a much reduced strength. One per cent. has given satisfactory results. The usual winter working of the land is essential for the retention of moisture and aeration of the soil, but in shallow soils in which many orchards are planted, deep working is most detrimental. The matter of seedling stocks for apples and the inferior plants frequently received from Southern nurseries prompts a query as to how many seeds have been stratified for spring planting, and if any effort is being made towards raising a local supply of nursery stock. In earlier years citrus planters were much dissatisfied with Southern supplies, which led to the establishment of local nurseries and later to bud selection. There is certainly sufficient enterprise and energy in the Stanthorpe district to make a similar attempt. Its application only is required.

Farm Notes for August.

Land which has been lying fallow in readiness for early spring sowing should now be receiving its final cultivation prior to seeding operations. Potato planting will be in full swing this month, and in connection with this crop the prevention of fungoid diseases calls for special attention. Seed potatoes, if possible, should be selected from localities which are free from disease; they should be well sprouted, and, if possible, should not exceed 2 oz. in weight. Seed potatoes of this size are more economical to use than those large enough to necessitate cutting. If, however, none but large-sized seed are procurable, the tubers should be cut so that at least two well-developed eyes are left. The cut surfaces require to be well dusted with slacked lime, or wood ashes, as soon as possible after cutting. Where it is necessary to take action to prevent possible infection by fungoid disease, the dipping of potatoes in a solution of 1 pint of 40 per cent. formalin to 15 gallons of water, and immersing for one hour, will be found effective. Bags intended for the subsequent conveyance of tubers to the paddock should also be treated and thoroughly dried. After dipping, spread out the potatoes and thoroughly dry them before re-bagging. Where the tubers are cut, the dipping is, of course, carried out prior to cutting.

Arrowroot, yams, ginger, and sugar-cane may be planted this months in localities where all danger from frosts is over.

Maize may be sown as a catch crop, providing, of course, that sufficient soil moisture is available.

Sweet-potato cuttings may also be planted out towards the end of the month.

Weeds will now begin to assert themselves with the advent of warmer weather; consequently cultivators and harrows should be kept going to keep down weed growths in growing crops and on land lying fallow, as well as on that in course of preparation for such crops as sorghums, millets, or panicums, maize, and summer-growing crops generally.

Tobacco seed may be sown on previously burnt and well prepared seed-beds.

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J. F. F. REID,
Editor of Publications, Department of Agriculture and Stock.

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ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

	July, 1929.		August, 1929.		MOONRISE. July, 1929.	MOONRISE. Aug. 1929.
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
1	6.47	5.5	6.37	5.19	a.m. 12.18	a.m. 2.22
2	6.47	5.5	6.37	5.19	1.18	3.28
3	6.47	5.5	6.36	5.20	2.22	4.37
4	6.47	5.6	6.35	5.21	3.30	5.41
5	6.47	5.6	6.34	5.22	4.39	6.38
6	6.47	5.6	6.34	5.23	5.49	7.26
7	6.47	5.7	6.33	5.23	6.58	8.6
8	6.47	5.7	6.32	5.24	8.0	8.42
9	6.46	5.7	6.31	5.24	8.51	9.13
10	6.46	5.8	6.30	5.25	9.35	9.46
11	6.46	5.8	6.29	5.25	10.12	10.16
12	6 46	5.8	6.28	5.26	10.58	10.51
13	6.46	5.9	6.27	5.26	11.17	11.26
14	6.46	5.9	6.26	5.27	11.47	p.m. 12.5
15	6.46	5.9	6.25	5.27	p.m. 12.18	12.49
16	6.46	5.10	6.24	5.28	12.51	1.39
17	6 45	5.10	6.24	5.28	1.27	2.31
18	6.45	5.11	6.23	5.29	2.7	3.14
19	6.44	5.11	6.22	5.29	2.54	4.19
20	6.44	5.12	6.21	5.29	3.44	5.20
21	6.43	5.12	6.20	5.30	4.37	6.15
22	6.43	5.13	6.19	5.30	5.31	7.11
23	6.42	5.13	6.18	5.31	6.27	8.8
24	6.42	5.14	6.17	5.31	7.25	9.5
25	6.41	5.14	6.16	5.31	8.18	10.3
26	6.41	5.15	6.15	5.32	9.15	11.4
27	6.40	5.15	6.14	5.32	10.11	...
28	6.40	5.16	6.13	5.33	11.10	a.m. 12.10
29	6.39	5.16	6.12	5.33	...	1.16
30	6.39	5.17	6.11	5.34	a.m. 12.9	2.22
31	6.38	5.18	6.10	5.34	1.14	3 26

Phases of the Moon, Occultations, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania.

7 July	●	New Moon	6 47 a.m.
14 „	☾	First Quarter	2 5 a.m.
22 „	○	Full Moon	5 20 p.m.
29 „	☽	Last Quarter	10 55 a.m.

Perigee, 6th July, at 11.0 p.m.
Apogee, 20th July, at 2·24 a.m.

On the 4th the Earth will be at its greatest distance from the sun, about 94,450,000 miles.

The apparent nearness of Venus and Jupiter, about the middle of the month, will be noticeable in the early mornings, though Jupiter, being on the far side of its orbit and Venus rather on this side, a distance of 500,050,000 miles must intervene between the two planets.

At 1 o'clock in the morning of the 27th the Moon will be passing Uranus, which will require a telescope or binoculars to be seen. This occasion will afford an opportunity to locate Uranus in the constellation Pisces, about twice the length of the Southern Cross to the south-eastward of the Great Square of Pegasus.

Near the middle of the month the zodiacal constellation Sagittarius will be over the eastern horizon at 6 p.m., Capricornus at 8 p.m., and Aquarius at 10 p.m. Markab and Scheat, the stars which mark the western side of the Great Square of Pegasus, will be just coming into view, and an hour later the whole Square will be visible.

The Southern Cross will be upright about 6 p.m. near the beginning of the month, and lying on its side, 30 degrees west of the South Celestial Pole, at midnight. At that time the brilliant star Achernar will be about as far on the eastern side of the Pole as the head of the Cross is on the western, but somewhat higher up.

5 Aug.	●	New Moon	1 40 p.m.
12 „	☾	First Quarter	4 0 p.m.
20 „	○	Full Moon	7 42 p.m.
28 „	☽	Last Quarter	6 0 a.m.

Perigee, 4th August, at 7.12 a.m.
Apogee, 16th August, at 1.0 p.m.

The conjunction of the Moon with Jupiter on the night of the 1st will take place below the horizon; when they rise about 2 a.m. the Moon will be a few degrees eastward of the planet.

The conjunction of Venus with the Moon on the 2nd, about 1 p.m., will be an interesting daylight phenomenon when the Moon in crescent shape is passing to the northward and below Venus, at a distance nearly as great as the length of the Southern Cross. Of course it will be necessary to have the sun shaded from view by a building or some opaque body. The position of Venus and the Moon will be about 45 degrees east of the Sun, but only about 15 degrees from the meridian.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 38 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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10. SEP. 1929
I.A.R.I. PUSA

QUEENSLAND AGRICULTURAL JOURNAL

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Event and Comment.

Dairying at Mackay.

ROUND about Mackay, particularly out towards the Eungella Range and beyond, there is some excellent dairying country and already the foundation of a sound industry has been laid there; and, with the establishment of a modern butter factory there is every reason why the industry should extend and that cream should be added to sugar as a sound economic combination. That dairy farmers in the Mackay district have started on right lines was evident at the recent show. With the cattle section the Minister for Agriculture and Stock, Mr. Harry F. Walker, who opened the show, was strongly impressed. After congratulating the farmers assembled on the general excellence of the exhibits, especially the cane, he expressed particular interest in the stock parade. Speaking of herd improvement he remarked that some people might not realise its importance, but he assured his hearers, who were mostly canegrowers, that successful dairying depended just as much on science as successful sugar cultivation. Through the greater care and attention now given to the essentials of his industry the Australian dairy farmer was able to produce butter of unexcelled quality. The market for good butter was anything but oversupplied, and farmers of the Mackay district who had suitable land and were otherwise in a position to do so could engage in dairying without any immediate fear of overproduction. Their market was assured and the industry provided a fair living. In the Gympie district last year 1,800 suppliers had averaged over £330 a man for butter; in addition, they had also produced pigs, maize, and other crops. He urged local farmers to interest their boys in the possibilities of dairying in their home district, to get them out on to the Range and help to keep their own butter factory going. He was big enough to give credit to the late Government and his predecessor in office, Mr. W. Forgan Smith, for many of the improvements brought about in dairying as well as in the sugar industry. They must, however, continue their efforts at herd improvement and create for Queensland further production records. Local production and manufacture would obviously bring more money into the district and that would also appeal to local commercial interests. With the good roads they had already, and other highways under construction and already planned, with motor transport and mechanical milking, there was nothing to prevent anyone with the necessary means and experience from engaging in an industry that was at once interesting and profitable. He appealed to the young men of the Mcakay area to remain on the land where they were better off, where they could live an independent life and acquire a competence, instead of worrying about getting a city job in which not only their usefulness, but very often their opportunities were unduly limited. He urged the farmers present to take advantage of the Better Bull Scheme and other facilities at their disposal for the improvement of district herds. Mr. Walker commended the quality of the dairy cattle exhibited which were equal to the stock paraded in Southern show rings, and which would provide a sound foundation for district herds when dairying developed to the extent that the great natural advantages of the back country of Mackay warranted.

Agriculture from an International Aspect.

HELPING to clear away the fog of misunderstanding that has, in recent years, enveloped many of the more important questions as between nations in the two hemispheres is a group of associations, such as the Royal Institute of International Affairs in Great Britain and the Council of Foreign Relations in the United States, which devote themselves to a sympathetic study of the world's affairs. They are quite unofficial, yet they are already beginning to influence for good the factors that govern affairs in the world to-day. They watch the formation and trends of international policy, and help to create that atmosphere of sound judgment and goodwill so essential in modern international relationships. They encourage the taking of the longer view that comes from sober consideration of any problem that arises and that may threaten the continuance of international amity. Through them the powers that are may be made aware of national tendencies before they reach a point of international tension. They help to break down the barriers that unduly restrict mutual understanding and appreciation of differing points of view.

As well as to the larger affairs of statesmanship these associations also encourage the study of industrial relationships, and the value of this study is evident from an address* by Sir Daniel Hall, K.C.B., on the dependence of agriculture on international factors, which we now have before us. In it he reminds us that we are accustomed to think of agriculture, though having some national significance, as more or less a local or parochial affair; and that many of the features which characterise modern agriculture are by no means purely national, but are world-wide, and may have to be met by international action. And he presses the point that we cannot consider merely our own agriculture when trying to find out the cause or origin of our own difficulties, but must regard the problems of primary production from an international aspect if we are to attain any reasonable solution of those difficulties. From the findings of the World Economic Conference at Geneva last year on the results of a world-wide inquiry into the economic situation, we get a confirmation of the fact that agricultural depression is world-wide—though there is a tendency, even in the address under review, to rather exaggerate some of the causes and extent of that depression. It is accepted, however, that there must be some general underlying cause which is affecting primary industry universally, and that is responsible for the fact that the man who is growing food and clothing—the world's first necessities—is anything but satisfied with what he gets for his outlay and his labour. The Economic Conference attempted to diagnose the cause of this, and arrived at the conclusion that it was the general lowness of price for primary commodities. The term is, of course, comparative, but on this question of low values it was agreed that in every producing country there is a disparity against the farmer.

Low prices, of course, are the natural corollary of over-supply. The question therefore arises: To what extent is the world over-supplied with the necessities of life? The lecturer had this to say about it:—

> It seems rather ridiculous to talk about over-supply of food when at the same time one hears of great populations all over the world who are confessedly short of the prime necessities of life. Therefore, the Economic Conference concluded that the over-supply was of a relative and not of an

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*Extract from the "Journal of the Royal Institute of International Affairs," Jan., 1929.

absolute character. In fact, if you come to analyse the figures a little more carefully; if you analyse, for instance, the relation between the world's population in the years immediately preceding the War, say, the years 1909 to 1913, and the amount of agricultural production during that period compared with the population and the agricultural production at the present time, you will find that the population has increased faster than the food supply. There is not a real over-production of food; but there is an over-production of food in relation to the consuming capacity of the peoples. By "consuming capacity" I do not mean their appetites, I do not mean their desire for food, I mean the amount of money that they have in their pockets wherewith to pay for food.

That is the real diagnosis of the situation. Because over Europe in particular there are so many millions of people unemployed, unable to exercise their normal purchasing power, the demand for food has fallen below the supply, and we have over-production with consequent low prices for all the producers of food. The essential need for the food remains, but because the world is disorganised and out of joint, because there are so many people here and in other disturbed regions of the world, like China, who cannot exercise their old purchasing power, the effective demand is below what we took as the average human demand in the years immediately preceding the War.

The Rural Exodus.

AFTER analysing the position from many angles, and reviewing the factors affecting the prices of primary products in various parts of the world, Sir Daniel Hall concluded his very informative and suggestive address with a reference to the rural exodus that is going on in every agricultural country. If no alternative can be found to the present unsatisfactory marketing methods there is a danger, he averred, that the destructive power of unrestricted competition among the farmers of the world will tend to destroy the agriculture of the world. There is in every country at the present time a tendency to leave the land. The young ones go whenever they get a chance and wherever they see an opening. Even in an agricultural country like France there is an extraordinary city-ward movement of the French peasant notwithstanding his own traditional attachment to his own bit of soil. All over the world the same phenomenon may be observed. The annual returns of abandoned farms in the United States show that the farmer, under the present prevailing conditions, is not prepared to stick it out. This is the slow change by which agriculture responds to low prices. You cannot adjust production quickly; but it does slowly adjust itself by the retreat of men from the land. "We cannot afford," continued the lecturer, "to go on letting these men go. I began by saying that the actual production of food in the world is, in relation to population, less than it was in 1914. We are actually in a short position, though the shortage cannot declare itself because of the difficulty that so large a proportion of the population experience in making their demand for food effective. Therefore, it is necessary for States like our own to consider what steps they can take to arrest this flow, lest we suddenly slip over the danger point and find ourselves in a real scarcity because there are no longer the people on the land to produce food for us."

The Welfare of Agriculture—An International Question.

THE world position of agriculture and its present day trends constitute something more than a national question; they have become of international concern. There are already in existence international organisations which gives some consideration to the conditions of primary production from a world-wide standpoint. One of these is the International Institute of Agriculture in Rome, whose business it is to collect and disseminate information as to statistics, markets, economic relationships, land tenure, and other factors. But the only international agency that views this world problem from the standpoint of the farmer is a body that grew out of an International Congress of Agriculture in France, and which calls itself the International Commission of Agriculture. Its aim is to unite tentatively, slowly, but in the end effectively, farmers' organisations throughout the world. It has already a considerable and representative membership of various rural bodies of most of the continental countries of Europe, and judged on its present standing and efforts it has all the components of a good and sound international organisation representing not the official or scientific points of view, but the actual economic demands of the farmers themselves. The attention that is being given to the problems of primary production that are common to most countries is a healthy sign, and any movement calculated to strengthen the farmers' economic position will, it may be safely assumed, meet with the sympathetic support of the industry in Australia.

Bureau of Sugar Experiment Stations.

INTERNATIONAL CONGRESS OF SUGAR-CANE TECHNOLOGISTS.

Subjoined is a report by the Director of Sugar Experiment Stations, Mr. H. T. Easterby, on the Third Congress of the International Society of Sugar-cane Technologists held at Sourabaya, Java, June, 1929, and on some phases of the sugar industry in Java, which will be read with interest by Queensland producers.

PART I.

THE SUGAR CONGRESS.

THE Third Congress of the International Society of Sugar-cane Technologists, by far the most important yet held, was opened at Sourabaya on Friday, 7th June, by an inaugural speech from Dr. H. Jelgerhuis Swildens, President of the General Syndicate of Sugar Manufacturers in the Dutch East Indies, and responded to by the President of the Congress, Dr. Jesweit.

Representatives from the following cane countries were in attendance, viz.:—Australia, Hawaii, Indo-China, Japan and Formosa, Java, Mauritius, Philippines, Trinidad, United States of America, British India, and Egypt.

Outside of Java, Hawaii had the strongest representation, thirteen members attending—five from the Experiment Station and eight from plantations.

The hospitality extended to the foreign members was beyond praise, and everything possible was done to make the stay of members in Java enjoyable and instructive.

Valuable Bulletins were read in Congress, which have been brought back for the use of the Sugar Experiment Station, but in my opinion the greatest value of these meetings lies in the personal exchange of views between the representatives of different countries and the cordial relationship thus engendered.

Papers were read at the general meetings on the development of the Java sugar industry, the development of selection and breeding of the sugar-cane in Java, irrigation, its organisation and impoitance for the Java sugar industry, and the economic advantages and drawbacks of the sugar-cane industry in Java.

In the Agricultural Section which I attended, papers were read or summarised on cane cultivation in Java, India, Mauritius, Fiji, Louisiana, and Queensland, and discussions took place on these as well as on soil surveys, chemistry of sugar-cane, and other cognate subjects. Other sections comprised factoiy operation and chemical control (upon which Mr. Bennett will supply data) and the diseases of cane, and insects pests.

On Wednesday, 12th June, a number of papers on varieties of cane were dealt with, and considerable discussion ensued which should be of much benefit to the industry.

On behalf of the Government of Queensland, the Minister's letter, containing a cordial invitation to hold the next meeting of the society in our State, was presented and supported by addresses by myself and Dr. Gibson, who represented the Australian Sugar Producers' Association; and who spoke also on this particular matter, on behalf of the Queensland Cane Growers' Council. After considerable discussion it was stated that the aim of the Congress was to hold the conferences alternately in the two hemispheres, and it was decided that Porto Rico should have the honour of the place of meeting in 1932, while in all probability Queensland would be selected in 1935.

At the final meeting, Dr. F. W. Zerban was appointed President of the next Congress, and various committees were then appointed. At my request Mr. A. F. Bell was placed on the Quarantine and Disease Committees, Dr. Kerr on the Agricultural and Soils Committees, and Mr. Bennett on the Factory Operations Committee.

The following resolutions were then carried:—

Resolutions.

"Whereas the discovery by Dr. E. W. Brandes of the transmission of sugar cane Mosaic by *Aphis Maidis* has proved of immeasurable value to all sugar-cane countries for making possible the development of effective control measures and the systematic breeding of resistant varieties, the section of cane diseases of the Third Conference of the International Society of Sugar-cane Technologists proposes that this Conference send to Dr. Brandes its sincere thanks and appreciation for this fundamental discovery."

"Whereas, exact knowledge on the influence of irrigation and drainage is still very incomplete, it is voted that a resolution be adopted that in all canegrowing countries more attention should be paid to these problems and that more scientific experiments should be carried out on this subject."

"Whereas, soil surveys and the classification of soils are fundamental for the proper study of soil fertility and manuring for the improvement and maintenance of sugar-cane soils, it is resolved that the Standing Committee shall—

(*a*) Secure as far as practicable uniformity in the classification and in the nomenclature of soils;

(*b*) Collect data on soils and fertility experiments on sugar-cane soils of the various countries concerned."

"Whereas at the present time many identical varieties occur under different names and also different varieties are cultivated under the same name, and whereas rational studies on sugar-cane need a reliable identification and description, and whereas cane breeding work needs the availability of all original canes and of those canes, which played a part in cane husbandry, and whereas further investigations on genetics and taxonomy of sugar cane are of prominent importance, for further development of the sugar-cane industry, it is resolved that the assembled delegates of the Java meeting of International Society of Sugar-cane Technologists recommend that in two or possibly three different countries collections should be made of all cane varieties mentioned above; and be it further resolved that the executive committee take the necessary steps for the establishment of such collection gardens."

"Whereas, it has been demonstrated that there is considerable risk in the unwary introduction of new canes into any country, and whereas it is desirable to keep track of the proper nomenclature of all importations and prevent further confusion in names, it is resolved that the assembled delegates of the Java meeting of the International Society of Sugar-cane Technologists recommend that new importations be allowed only in small quantities and to recognised institutions, and that steps be taken to record at the time of importation at some central place in the country, preferably under a botanist, full details about the variety such as the name, country of origin, a short description and specimens of canes, buds and leaves, and whenever possible it is further desirable to keep the cane growing at the central place at least for a time to render its subsequent identification easy and certain; and be it further resolved that copies of this resolution be sent to all Government and other institutions interested in the sugar-cane industry and to the standing committee."

"Whereas, the current technical literature on sugar-cane and beet is published in a large number of periodicals and often is written in a language which is only understood by a minority of the technologists or is not available in the local libraries, whereas further reinforcement of the interest of organisations and of the personal members of our association is desired for further development of the activities of the association, be it resolved that a new periodical be started or an existing periodical be requested to publish adequate abstracts in the English language, submitted by the authors themselves, of all technical papers of more general importance; and be it further resolved that a committee be appointed by the chairman to devise ways and means for carrying this resolution into effect."

"Whereas, at the present time different countries report their field and factory results in many different and unrelated units, thus making mutual comparisons extremely difficult and time-consuming, and whereas, the metric system is based entirely on the decimal system of numbers, and relates logically measures of volume to measures of mass, has been legally adopted by most countries, and is in universal use throughout the scientific world, be it therefore resolved that the cane sugar industries of the countries represented in this society be urged gradually to introduce the metric system, and that until that is accomplished, they publish all field and factory results in metric units, either exclusively or along with the customary units."

"Whereas the International Committee for Uniform Methods of Sugar Analysis has not held a meeting since 1912 and has practically disbanded, and whereas there exists at the present time a great deal of confusion owing to the use of different analytical standards in different countries, be it therefore resolved that a committee consisting of Messrs. F. J. Bates, C. A. Browne, Noel Deerr, P. Honig, and W. R. McAllep be appointed, which committee shall approach prominent sugar chemists in all important countries producing sugar from the beet or cane, for the purpose of reviving the International Commission for Uniform Methods of Sugar Analysis.''

In the course of the meetings and at their conclusion, a number of excursions were arranged for members to

(*a*) View institutions of general interest;

(*b*) Excursions for factory experts; and

(*c*) Excursions for agriculturists and soil experts.

These were of a highly interesting character, especially the one to the Pasoeroean Experiment Station, which will be commented on later.

The Government of Java and private railways granted a free pass over their lines to each member.

The final function was an official dinner at Bandoeng, at which the hospitality, kindness, and courtesy shown to members of the Congress by Java was suitably acknowledged by the representatives of the other countries.

In concluding this part of the report it may be said that it will be exceedingly difficult for any country in which the Congress may, in future, be held, to reach the high standard set by Java. The cost of the Congress to the General Syndicate of Sugar Manufacturers must have been very great, including as it did all the printing of papers, &c., and the various excursions and entertainments which were given. Strong committees were formed, including Honorary, Executive, Preparations, and Accommodation. Such committees will be necessary in the case of a visit to Queensland at a later date, and all sections of the industry will need to be strongly represented and to work hard in order to make the Congress as successful as it was in Java in 1929.

PART II.

SOME PHASES OF THE SUGAR INDUSTRY IN JAVA.

(*a*) GENERAL.

It may be said that the sugar industry in the Dutch East Indies is confined to Java. Sugar-growing on a small scale has been carried out in Sumatra and the Celebes, but the relative scarcity of labour precludes its present success.

The output of sugar in Java has been steadily increasing, as the following figures will show:—

	Tons.
1922	1,808,000
1923	1,793,000
1924	1,997,000
1925	2,300,000
1926	1,973,000
1927	2,309,000
1928	2,950,000

Java now ranks second to Cuba in cane-sugar production. Its average production per acre is 6 tons of sugar.

The total cultivated area of Java is given as 16,700,000 acres, of which 480,000 acres are under cane—or not 3 per cent. It can be seen, therefore, that the yield of sugar per acre is very high. All the sugar-cane is grown on the eastern side of Java.

The Land System in Java.

Practically all the land used for canegrowing is rented from the natives of Java. The Government protect the natives against themselves as they would be willing to sell their lands for any slight sum, and as one Java man put it, ''Buy a fountain pen with the proceeds, with which he could not write.'' The rent is fixed by the Government on the basis of the probable maximum rice production of the land in question.

For the same reason land cannot be rented by Europeans for longer than three and a-half years unless a minimum rent is paid, fixed by the Government. In 1926, over £2,000,000 was paid for supplies of materials and rent of land, while the wages paid to native labour in the same year is given as being £8,000,000. The amount of taxation, direct and indirect, paid by the sugar industry and its employees, amounted to £2,000,000 in 1926.

The Present Position of the Industry.

There are stated to be 179 plantations in Java, the area of cane supplying these mills varying from 1,750 to 5,000 acres; the bulk of the mills, however, were supplied from areas of cane of 1,750 to 2,800 acres. It will be seen from this that the mills in Java depend for the greater part on smaller acreages than in Queensland, the much higher yield of cane and sugar per acre accounting for this. Practically all the plantations grind their own crops. Of the 179 mills, over 100 are owned or managed by seven companies. Outsiders seldom start sugar mills, only the established concerns with long experience of Java conditions, and possessing adequate capital, making new ventures. The larger mills have latterly been increasing both by extension and amalgamation. It is necessary to obtain permission from the Government in order to build a new mill or to extend the area of an existing plantation, and this permission may be withheld if there is a probability that a new mill would endanger the welfare of the native population in the district.

The value of exports from Java in 1926 was £63,000,000; of this the sugar industry accounted for £23,000,000.

Transport conditions are in many cases crude, the buffalo-drawn two-wheeled wagon being still largely used, but this is gradually being superseded by locomotive and motor traction.

Only plant crops are grown, as after one crop of sugar-cane the land has to be returned to the native owner for the cultivation of native crops, such as rice and maize. Sugar-cane is only allowed once in three years, so that a legally enforced rotation becomes imperative. It is for this reason, combined with the intensive cultivation of small areas by hand labour, that the yield per acre is so high. It also means that the area of an estate is at least three times larger than its annual plantation.

There are about 900,000 unskilled labourers, mostly in the fields; children and women earn from 4d. to 6d. per day, and men from 10d. to 1s.—all on piecework. When a native considers he has earned sufficient for his wants he will very often sit down for the rest of the day. This class of labour is mainly employed between April and October; they have other means of support during the months of November to March. In addition to this large mass of unskilled labour, the sugar industry in Java employs some 56,000 regular native employees, most of whom are more or less skilled, and are paid according to their position from 1s. to 7s. per day—the average running from 1s. to 2s. 6d. per day.

The General Syndicate of Sugar Manufacturers practically comprises all the companies owning or managing sugar mills in Java, and its principal work is controlling the agricultural, fiscal, irrigation, and educational problems—e.g., the experiment station. The United Sugar Producers' Association of Java controls the sales of sugar. It is somewhat remarkable that the island of Java with its immense population of 40,000,000 consumes less sugar than does Australia. The principal buyers of Java sugar are British India, Japan, and China. Two-thirds of the manufactured sugar is plantation whites. No refined sugar, as far as I know, is made in Java.

(*b*) CANE CULTURE.

The price paid to the natives for leases, and the forbidding of growing ratoon canes, compels the plantations to get the highest possible yield of cane and sugar per acre, and for this reason the cultivation has necessarily to be of the most intensive character. The intensive cultivation is made easy for the sugar planter in Java, because of the abundant and cheap supply of labour; hence the tillage operation is carried out almost entirely by hand, and planters say that hand cultivation is cheaper for them than mechanical cultivation.

Methods of Cultivation.

The cultivation of the cane is mostly carried out on what is known as the "Reynoso System." After the rubbish from the previous crop of rice, &c., has been removed, the drills to receive the cane are dug in the land by hand, and the earth or clods are piled up symmetrically at the sides so as to form a comparatively deep channel, the interspaces being left entirely untilled. It is thus possible to plant the cane much deeper than is done by any ploughing system, and the cane can later on be hilled up higher, obviating the risk of lodging by affording more support to the roots of the cane.

Ploughing the soil is not much used in Java, though it is applied in some districts to lighter soils, where it does not give much less output in sugar.

As the greater part of the land on which cane is grown has had a previous crop of rice under water for months it is imperative that the land be drained, and, accordingly, drains are dug in the shape of trenches, including a ring drawn round the field, so that at the lowest point any superfluous water is removed as quickly as possible. It is usual to try and lay out the drills for cane in a north to south direction, so that the plants will obtain as much sunlight as possible. After the drainage trenches are dug, the digging of the planting drills commences. The soil is usually saturated with water from the previous crop, but the natives are used to working the soil in this manner. It may be pointed out here that, while there are large numbers of canefields, none of them are very big in area. Considerable attention is given to the proper piling up of the clods removed from the planting drills. The depth of the drills varies from 12 inches to 18 inches, and may be from 16 inches to about 2 feet in width. The distance from centre to centre of the drills is usually about 3 feet to 4 feet 6 inches in width. Sometimes the depth of the cane drills is made by digging twice, or by digging once and then by forking out or chipping out the bottoms. The field is then left fallow for some time, being exposed to air and sunlight. Frequently before planting, some of the oxidised earth is taken from the sides and placed at the bottom of the drills. Some planters, however, put the plants on the untilled bottom of the drills. As a rule, some earth is placed in the drills so as to get a desirable planting depth.

The System of Planting.

When planting in the bottom of the drills the soil is first made wet by watering it; when the water has drained away the cane cuttings are pressed into the ground to the desired depth. This is usually done by women or children. Other methods are laying the sets in the bottom and covering by earth, while single budded cane is sometimes planted in holes in the drills made with a stick. These plants consist of part of the stalks of cane in the fields that have sprouted buds. The tops are cut off to provide seed cane and the lower parts left on the field till the buds have sprouted; these are then also cut for planting material. In order to get the plants spaced properly ropes with knots at measured intervals are sometimes used and stretched along the drills, the women placing the plants where the knots coincide. When cuttings are used lying horizontally, care is always taken that the eyes lie on each side and are not put underneath the plant, which gives rise to poor germination. Sometimes the cuttings are placed obliquely in the ground. Planting material is taken from the top seed of the standing cane, cuttings of the under portion which has sprouted, cuttings from hill nurseries, and cuttings from specially laid out nurseries on the plains. Formerly much cane planting material was brought from the hills owing to its superior resistance to the Sereh disease, but the almost universal planting of the variety P.O.J. 2878 has made this superfluous. What is known in Java as ''rajoengans'' or sprouted cane is much used, and pieces with two buds sprouted are usually recommended for planting.

Usually the cane is covered in three times, the earth which lies on the sides being used for this purpose. Often the earth which lies on the sides of the cane drills is turned over before applying the second covering in, so as to better aerate it, thus exposing the hard clods to the effect of the air and sun. This turning over generally puts some loose soil into the drills. Finally, all the soil at the sides of the drills is removed and laid against and between the cane stalks. A large quantity of water is desired then in the heavier soils, as otherwise the clods cannot be made fine enough, and the soil will not fit sufficiently close to the cane stalks. As the final hilling up is usually done at the beginning of the wet season when the cane is from four to six months old, little or no irrigation water is then available, and it is usually left till the first rains of the west monsoon. Before beginning with the final hilling up—which, of course, too, is done by hand—the lower leaves, mostly trash, are removed, so that the earth may fit closely to the stalks, and the earth is stamped against and between them.

Irrigation Practice.

During five months before the rainy season the cane is periodically watered by women throwing water into the drills by means of pails or cans fixed on handles with which they dip the water out of the irrigation channels.

Irrigation plays a large part in the cultivation of cane, and the different irrigation works in Java are on a scale of considerable magnitude. Only a very small percentage of the cane is cultivated upon unirrigated soils. In fact, this is said to be only possible in recent volcanic soils having a high capillarity.

Fertilising.

The manure principally used in Java is sulphate of ammonia, and this is applied to practically every acre under cultivation. Superphosphate is only used on about 79,512 acres of the total area (about 480,000), while potash is hardly used at all, as it is stated that, with one exception, it nowhere had any beneficial effect on the sugar yield, not even on soils poor in potash. Molasses and stable manure have been used to some extent. Green manuring is not practised, as it has only been found to have a beneficial effect occasionally. The results have always been found to be irregular, but it has been admitted that the green manures used have not always been wisely chosen.

Sulphate of ammonia is generally given in two to three doses, generally at the same time as the hilling up is being done, and takes place from three to four and from six to eight weeks after planting. This is done by native women who make a small hole near each stool of cane and pour an accurate measure in from a carefully adjusted spoon. The manure is thus concentrated and does not contribute to the growth of weeds. The whole dose is given within two months after planting. The amount of sulphate of ammonia used averages about 4 cwt. per acre. The weeding is all done by hand.

(c) THE EXPERIMENT STATION.

The Sugar Experiment Station at Pasoeroean is acknowledged to be the finest in the world. It is the property of the General Syndicate of Sugar Manufacturers, and possesses its own governing board, and its own revenue. The annual contribution of the sugar factories is at the present time equal to about 4s. 8d. per acre, the revenue amounting to more than £116,000 per annum.

The work of the Experiment Station in Java is carried out by three departments—the Agricultural, the Technological, and the Engineering—each having its own director. The aims of the institution have been summarised as follows:—

> "The search for the best condition in each step of planting and manufacturing beginning with the tillage of the soil and ending with the shipment of the manufactured sugar."

The permanent staff of this Experiment Station at the present time consists of about 45 Europeans, 10 Chinese, and 250 natives, in addition to which there are fifteen European local agents in the Extension Service of the Agricultural Branch. There are thirty-four houses for the European staff, and eight of the fifteen houses occupied by the Extension staff are also the property of the station.

The library contains 20,000 volumes, and is one of the largest in the Tropics. It also does its own bookbinding, &c. There is also a fine museum. Medical attention to the staff is provided free.

The Agricultural Branch.

The main objects of the Agricultural Branch of the Station are the study of cane from the botanical, taxonomic, and physiological point of view, internal and external morphology, entomology, cytology, and genetics, breeding of new varieties of cane, studies of the soil, drafting of agro-geological maps of the estates, investigations into weeds on the sugar-cane soils, elaboration of field experiment results, most advantageous manures, times of planting, suitable spacing, studies of diseases and pests, and gathering of statistical data. The local agents doing extension work give advice to factories, collect material for the agro-geological mapping of the sugar estates, control field experiments and make reports furnishing miscellaneous information.

Field Experiment Service.

The object of the field experiment service is to study by the aid of field experiments all questions connected with sugar-cane cultivation. Last year, 153 factories took part in the field experiments, and about 2,400 of these trials were harvested. The experiments are carried out by the factories on the advice of the Agricultural Branch of the Experiment Station, and remain under its supervision until they are harvested. It was by the work of the field experiments, in which the yields of newer varieties were compared with the older ones, that the superiority of P.O.J. 2878 was demonstrated in so short a time. In four years— viz., from 1926 to 1929, this variety spread from ½ per cent. to 93 per cent. of the total sugar-cane area of Java.

In order to obtain reliable results the experiments are repeated at least ten times in the same field, the small plots being arranged in chess-board fashion, and are harvested and milled separately. The averages are based on the theory of probability, and render an immense amount of calculations necessary. This work is done in a special office with the help of modern calculating machines, some of which are electrically driven.

Laboratories are provided for soil investigations, entomological, pathological and physiological researches.

The cane breeding and selection section occupies four rooms, and in order to have sufficient material for crossing purposes, the Station has brought together a large collection of cane varieties, which amount to 650. The collection is planted out in the fields of the Experiment Station, while duplicates exist at Malang where a different climate is experienced.

The cane breeding work will be referred to again later on.

The Technological Department.

The Technological Department of the Experiment Station comprises a sugar laboratory, where differences between buyers and sellers are adjusted, an analytical laboratory where special analyses of materials used in the sugar industry are made, also samples of boiler scales, waters of condensation, &c., are analysed. Research work covers the study and improvement of usual and new methods of analyses. There is also a chemico-technical laboratory where investigations are made into the various mill problems, a research room, physico-chemical laboratory, organic and chemical laboratories and rooms where the factories' control are governed. The factories taking part in this control numbering 164, out of a total of 179, send in their data fortnightly, and these are worked out and compiled in such a way that all data is comparable.

The Engineering Department studies the design and operation of the machinery and apparatus of the sugar factories.

Altogether, there are 92 rooms in the Experiment Station, including stores and workshops where instruments are repaired, and, in many instances made. Thermometers, hydrometers, pyrometers, manometers, water meters, and electrical apparatus are repaired and verified on behalf of the factories contributing to the Station.

From this brief résumé it will be seen that the Experiment Station plays a highly important part in the sugar industry of Java, and it is undoubtedly due to this institution that the industry is in the efficient state it is. No one who visits that Station can avoid paying a high tribute to the splendid work of its scientific staff.

As the factory owners in Java are the planters of the cane there is no conflict of interests. Hence it is not alone in the factory side that the Station has contributed to the raising of efficiency, but on the agricultural side it has played a great part in the creation of new seedling canes and in its field experiment work.

(*d*) SEEDLING RAISING.

It may be said that the work of raising seedlings in Java is at the present time on a higher plane than in any other country in the world. This is largely due to the adoption of new methods and the high scientific training of those in charge of the work. Hitherto, it has been the practice to raise seedlings from what are termed "noble" canes only. Owing to the prevalence of the Sereh disease in Java it became imperative to pay more attention to the breeding of canes resistant to this disease. This was attempted by the crossing of the so-called noble canes with resistant "wild" canes, and it has been in pursuance of this line of propagation that the now famous P.O.J. 2878 has been produced. The "Kassoer" cane which is resistant both to Mosaic and Sereh was found growing wild in Java, and Dr. Jesweit considered it to be a cross of the noble cane "Black Cheribon" and a wild cane "Glagah" (*Saccharum spontaneum*) which contains no sugar. Further support for this view has been furnished by Dr. Van Bremer in his cytological investigations, but final proof was obtained by artificial crosses between the noble cane and *Saccharum spontaneum*. For this reason crosses with Kassoer hybrids have strongly come to the front in recent years. The best of them are stated to have inherited from their "noble" parents the high sugar yields and from Kassoer the resistance to the principal diseases affecting sugar-cane in Java. Special investigations are now being made by the cytologist in the examination of the chromosome numbers within the nuclei of the generative cells of the pollen-mother cells, and it is considered that this will have an important bearing on the work, as it appears there is a correlation between the number of chromosomes and the size of the cells, and by these observations it may be possible to breed canes still more robust.

In the later series of canes bred after 2878 the wild blood has become more diluted and they have proved to some extent not quite so resistant to Sereh disease, so that it is hoped by crossing canes with higher chromosome numbers to obtain more valuable sugar-cane plants.

(c) FIELD EXPERIMENTS.

The Experiment Station state that they have now at their disposal the results of so great a number of field experiments as no other culture on earth can boast of. Up to last year no less than 21,676 complete field experiments had been conducted. These embrace variety, cultivation, and fertilising trials, and all advices issued by the Station are based on the results obtained. Particulars of the lay-out, treatment, and calculation of results from these experiments have been secured, and it may be said that the Queensland Bureau of Sugar Experiment Stations is now engaged in laying out trials of a similar nature in various parts of the sugar areas.

CONCLUSION.

It has been many times asked and will be asked again, what lessons can Queensland learn from Java? To this it may be replied that as far as the culture of the sugar-cane is concerned the conditions in the two countries are so radically different that it would be impossible to apply Java methods of cane culture to Queensland. As a matter of fact, cane culture in Java is not "agriculture," but has been aptly described as "horticulture."

Imagine our farmers digging all the cane drills in a field and neatly piling the clods at the sides. Imagine their wives and children planting the cane and irrigating by pouring pails of water over the plants by hand from the neighbouring irrigating ditches, and making holes and pouring carefully measured spoons of fertiliser against each stool. Imagine the different hillings up, and the care taken in the final hilling up when the trash is pulled off the cane and the earth fitted closely up to and between the stools, all by hand labour. Imagine all these operations which actually take place in Java, and then ask—Would it be possible to carry them out in Queensland? Cane so grown in Java is on an immense number of small areas and the crop being all the same variety is marvellously uniform in appearance at maturity.

But we can learn much from Java on the scientific and experimental side. We can learn a great deal about seedlings and field experiments and we can try to copy their amazing scientific thoroughness as far as circumstances will permit. The Dutch people recognise the value of science applied to the sugar industry and are willing to pay for it.

I have to thank the various officers of the Pasoeroean Sugar Experiment Station for many courtesies, and also for very much of the information I have been able to give in this report. I found a whole-hearted desire on the part of the syndicate and its officials to give as much information as they could on the various questions submitted to them.

JAVAN SUGAR MILLS.

Following is the Report of the Sugar Technologist, Mr. Norman Bennett, on the Sugar Mills of Java.

I HAVE to submit the following report on Javan Sugar Factories as seen during a tour of some five or six factories during the trip arranged by the Java Sugar Syndicate during the third Conference of Sugar-cane Technologists, June. 1929.

The time available for the inspection of the individual factories was short, and the number visited not large. However, I was enabled, through the courtesy of Mr. Ch. Nielsen, of the Handelsvereeniging Amsterdam, to make a visit to one of that company's new factories Goenongsari. The design of this factory and two others of recent construction embodies many new features in machinery installation.

Much of the data available on Java sugar factories has already been commented upon in a detailed report to the Department of Agriculture, at the end of 1924, after a three months' trip among the Javan mills. A further short report was made last year at the completion of the scholarship period. The information contained in these reports is to be taken in conjunction with this report which will merely cover the essential reports briefly and include newer ideas developed during the past few years.

In this respect, the policy of the Javan industry in relationship to the research work of the Experiment Station must be particularly noted. The technical department is divided into two sections—viz., Chemical section and Engineering section.

Research Work.

The research work of the Chemical section is done at excellently equipped laboratories at the Experiment Station at Pasoeroean. The application of the results obtained is then applied to factory work proper. At the same time, the section has attached to its staff several practical men whose advice on matters pertaining to chemical control or factory procedure is available at any time.

The research work of the Engineering section is done both in miniature at Pasoeroean and in actual practice at the mills.

At the present time the Chemical section is investigating the following problems:—

1. The structural alterations to the cane fibre as affected by various methods of preparatory devices and the subsequent effect of maceration with both cold and hot water.

   The most interesting point brought out to date is that ordinary methods of preparation for milling leave many of the juice cells of the cane unbroken. This must naturally affect the time factor and the efficient use of maceration water. The thermal death point of the cells has been determined at 130 Fahr.

   This research has a very definite bearing on our Queensland system of preparatory treatment followed by hot water maceration.

2. An investigation of Javan sugars with a view to improving colour quality, refining value, &c., and the relationship of the various clarification systems—e.g., defecation, sulphitation, and liming on the final product. Ultimately this investigation will have a direct bearing on the various boiling systems in use.

   Apart from such work which is of highly scientific nature, the section is conducting a system of uniform control of the re-agents used in the determination of Hydrogen ion.

   In addition, a system of mutual control of the boiling house operations has been prepared by the Station staff, and the Javan mills forward their working figures to the station every fifteen days. These figures are compiled on uniform principles and a typed comparative sheet of the work of all mills is then distributed to the associated mills.

   This system of mutual control is also applied to the figures of milling work and to fuel control.

Engineering Problems.

The Engineering Department has the following problems in hand:—

1. The application of pressure evaporation to cane juices.
2. The use of air-pre-heating for boiler efficiency and fuel economy.
3. Extensive factory trials of variously designed bagasse furnaces.
4. The extended use of hot water maceration as influenced by the research work of the Chemical section.

In respect to reasearch work as previously set out, attention must be drawn to the policy of the Dutch scientists of submitting every new idea to rigid trials, both on a laboratory scale and on factory tests, before recommending the method or plant to the industry.

Two examples of this system of investigation are:—The rapid elimination of other varieties of cane, in favour of P.O.J. 2878; and the installation of feeding rolls to all mills to assist the feeding of bagasse into the mill.

This latter device is one well worthy of trial in Queensland where the present feeding device is a clumsy pusher.

The Javan Factories.

There are about 180 factories operating in Java at the present time. Most of these have been in operation for fifty years or more. Since 1926, three new factories have been erected by the H.V.A. However, there does not appear to be much likelihood of many more new estates being opened up owing to the conditions laid down by the Government, when application for a charter is made.

The factories in Java are run as an integral part of the whole estate, all cane crushed being supplied direct from the fields cultivated by the company, consequently there is no need for any cane-payment scheme. At the same time it must be remembered that the mill is run in order to obtain the maximum yield from the field. At times this means that the factory may be run at a much greater crushing rate than that which would give the best mill figures.

Since the introduction of P.O.J. 2878 with its higher tonnage yields per acre, the mills have greatly increased their crushing rates. One mill which was visited in 1924 was crushing at the rate of 25,000 piculs per day, and now has increased its crushing rate to 37,000 piculs with no further additions to the original plant installed in 1923.

In general, the standard size of the mills is 30 in. by 60 in. with a 30 in. by 60 in. crusher and a 12 roller plant. Preparatory knives are not used except in two factories, and the Krajewski type of crusher finds most favour. There are some mills which have neither crusher nor knives and these installations are usually equipped with a crusher top roll. The average tonnage of cane crushed is between 1,000 and 1,500 long tons per day, and the milling plant is in operation for three to four months of the year, between May and November.

The milling work, judged on sucrose extraction figures, is not as good as in Hawaii; the final bagasse is very coarse and the quantity of imbibition water is usually under 20 per cent. on the weight of cane.

The control of the milling and factory work is based on the weights of the various products of the manufacturing process. These weights are obtained either by direct weighing or by calculation from volume measurements. The Maxwell-Boulogne type of automatic juice and imbibition weigher is considered to be the best, and installations of this type of machine are gradually increasing.

The mills are usually driven independently by steam engines of the Corliss type, with an increasing tendency to some form of automatic speed regulation controlled from the governor by oil pressure on the top journal of the mill.

There are only three electrically driven mills in operation—one installed in 1923 is driven by A.C. motors; the other two, erected in 1927 and 1928, are driven by D.C. motors of 250 horse-power.

The clarification processes used in the mills vary with the type of sugar produced. Three distinct processes are in use:—

1. Defecation—lime only. This type of clarification produces a raw sugar of two grades according to colour variations—viz., Head Sugar of 16-18 Dutch Colour Standard having an average polarisation of 98.4; and Muscovado Sugar 14-16 Dutch Colour Standard, with an average polarisation of 97.5.
2. Sulphitation—usually the hot process in which the juice is heated to 75 C. before sulphitation. Sulphitation in the cold is practised by only two or three mills. This process produces the two grades of raws as above if required, but if the massecuite is submitted to double purging with steam drying in the second purge a plantation white sugar is produced of 25 Dutch Colour Standard and higher. The size of the grain of this sugar corresponds to that of Australian refined, but is coarser and more liable to variation than American Standard Granulated.

   Note.—Both the above processes use settling for removal of the impurities; the settling being universally of the intermittent type as distinct from the Queensland system of continuous settling.
3. Carbonation for the manufacture of white sugar only and a very low-grade molasses sugar. The juices are limed very heavily, then carbonated and passed through filter presses. The carbonation is usually double, but a few mills use a single carbonation process—Procede de Haan. Sweetland presses have been used at the two new H.V.A. mills for the filtration of the carbonated juice. Further trial of this type of filter is being made,

Evaporators.

These are usually of standard quadruple type with the heating surface of the first body double that of the other vessels. The extra heating surface gives a supply of steam which is used for the heaters or for one or two of the pans. Later types of evaporators tend towards a quintuple with the bodies of the semi-Kestner type—i.e., tubes of 3½ meters in length. The new factory Goenongsari is equipped with a Kestner pre-heater and a quintuple of 5 semi-Kestner bodies and steam is bled from the first and from the second body of the quintuple. The set is fitted with automatic juice regulation.

Boiling Station.

The pans are usually of the coil type; these find favour instead of the quicker boiling calandria pans. Usually all pans and the effects are connected to a central condenser of barometric type with connection to a horizontal dry-air pump.

The pan station is well equipped with crystallisers and with centrifugals. The system of double purging for white sugar makes an increase in the number of centrifugals required. After purging, the sugar is passed through a drier, and after drying is often elevated and allowed to drop against a draft of cool air. Some factories pass the hot air from the drier into a closed room to recover the fine particles of sugar carried over by the current of air.

Boiler Station.

The boilers are usually of fire-tube type, but water-tube boilers generating steam at 12 and in the newer factories at 17 atmospheres are being installed. The boilers at the latter steam pressure are equipped with the Ruth Steam Accumulator.

Firing of the boilers is done by hand due to cheapness of labour, and the furnace construction is of the sloping grate type. The design of the furnaces has recently been altered to give a longer fire bar, and the step grate is closed to within 9 inches of the bottom to force the air through the grate.

All furnaces are used for one type of fuel only; no attempt is made to burn wood or cane trash in the same furnace as bagasse.

Many of the mills have a large surplus of bagasse, and this is baled during the crushing season and stored for subsequent use in the following year or for use in locomotives.

Cane Transport and Unloading.

A considerable amount of cane is hauled to the mill by means of ox wagons. Some of the larger plantations supplement the supply by small gauge tramlines and portable rail. The unloading at the mill where the cane is delivered by carts is usually done by hand and the cane carrier is hand fed. Where rail cars are used the cane is lifted out of the cars in slings and dumped on to an unloading table parallel to the cane carrier and dragged off the feed table by sliding rakes.

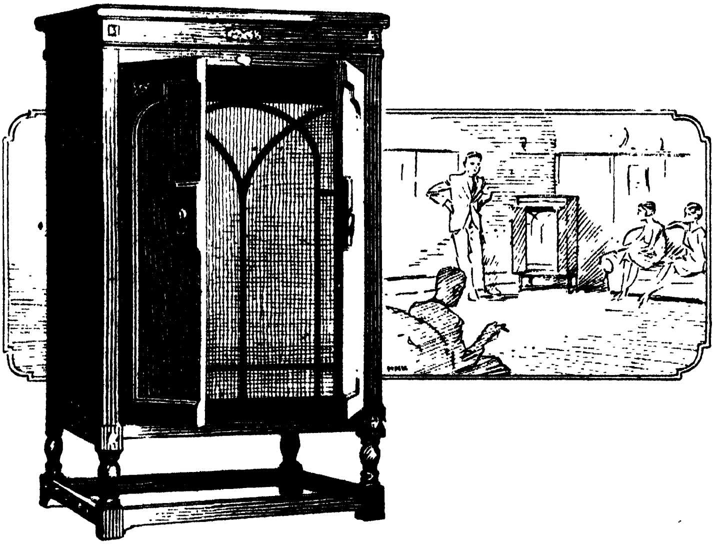
The above embodies the general practice in the Javan mills. Further reference should be made to the report of 1924 which was distributed by the Bureau to all Queensland mills.

ENTOMOLOGICAL HINTS TO CANEGROWERS.

The following monthly hints to canegrowers have been received by the Bureau of Sugar Experiment Stations from the Entomological Laboratory at Meringa:—

Growers whose cane has suffered severely from grubs this year, and who are considering fumigating certain of their worst blocks during the early part of the coming year, are advised to place their orders for fumigants at an early date as only a limited amount is obtainable at short notice, any large quantities having to be obtained from overseas. Farmers requiring advice on the ordering of the fumigants, as to where and how obtained, and also of injectors for same, should communicate with the secretary of the Cairns Canegrowers' Association, Mr. F. C. P. Curlewis, or with the entomologist at Meringa, who will be pleased to supply details.

Attention is also drawn to the demonstration at South Johnstone of a horse or tractor drawn machine for the injection of liquid fumigants, which should prove highly satisfactory for use in cases where the growth of the grub-attacked cane will allow the passage of a horse. This demonstration is to take place at Field Day.



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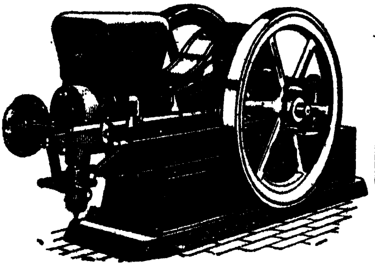

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During this month most of the grubs will have gone deep down into the soil preparatory to pupating, and, as this state occurs at a depth of from 12 to 21 inches, they are now beyond the reach of most farm implements, and remain undisturbed by ploughing and cultivating operations.

In September and October further grub attacks will occur in patches, but this will be due to the ravages of the "frenchi" grub which does its worst damage during the months mentioned. Fumigation with carbon bisulphide is recommended for this pest as it is easier to kill than the "greyback" grub, and if the cane be fumigated, even after showing damage, it stands a good chance of recovering when the grubs have been suffocated.

During July and August also a great deal of cane appears with leaves barred in white patches. It must be noted that this state is occasioned by neither insects nor disease, but is solely due to cold weather conditions.

The Meringa Experiment Station now has tachinid flies for release on borer infested farms, and growers desiring these parasites are invited to communicate with the entomologist at Meringa regarding liberations.

CANE PESTS AND DISEASES.

Mr. A. N. Burns, Assistant Entomologist, stationed at Mackay, has submitted the following report (2nd July, 1929) to the Bureau of Sugar Experiment Stations, with reference to greyback grubs:—

Observations made during the past fortnight at Mia Mia and several other portions of the Mackay district where grubs have wrought serious injury to cane, clearly show that their feeding season is almost over, and that they are burrowing deeper to form their pupal cells. Much further damage from these pests this season will not occur. It was surprising to note upon visiting several places that were inspected only three or four weeks previously, and where damage was very severe and extensive, that little, if any, further injury had occurred. In one particular area it was noted that the cane looked slightly better than on the previous visit; certainly an indication that the grubs were leaving the cane roots, thereby allowing the cane to form new young roots without their being eaten off. Several examinations made (mostly at Sarina) showed that the grubs were then at depths varying from 8 to 10 inches.

The two recent cold snaps have no doubt been largely responsible for causing the grubs to cease feeding, and burrow downwards to form their pupal cells. Last year some grubs were found feeding right up until July, but the weather had been milder. The minimum grass temperature this year in the middle of June was 35 deg. Fahr.

After forming their pupal cells the grubs will remain perfectly quiescent for some weeks, perhaps three months, before the actual transformations into pupæ. This period of complete inactivity is called the "pre-pupal state," and, as it progresses, the grub's body becomes more limp, till finally the skin splits along the dorsal area and peels off—a fine almost semi-transparent tissue—leaving the soft brown pupa, which, however, soon becomes hardened.

Pupal cells are found at varying depths, according to the nature of the soil and other conditions, but the average depths vary from about 12 to 18 inches. In loose and friable soils they are reported (Bulletin No. 13, Bureau of Sugar Experiment Stations) "as having been found at a depth of 4 ft., and that grubs had frequently been found in their cells at depths varying from 3 feet to 3 feet 3 inches." In soils where the subsoil is clay or other similar hard substance, the grubs would certainly not go down to that depth. Occasionally in soils that retain moisture well, as on some river flats, pupæ are sometimes ploughed up.

The pupal cells are oval in shape, and the wells inside are smooth and hardened, being lined with soil specially treated by the grub during the process of formation. The actual period spent in the pupa itself is variable, but is usually comparatively brief; records obtained from examples bred in cages at the laboratory last year gave this period as varying from four to five weeks only. Upon emergence from the pupal shell, the beetle is very soft, and as yet unable to emerge from the soil. It therefore remains quiescent within its cell—sometimes for six or eight weeks, or even longer—being almost wholly influenced by weather conditions, upon which it is dependent to enable it to break through its cell walls and thus burrow upwards.

During a long spell of dry weather, when the soil becomes hard, many beetles are thus prevented from leaving their cells, and consequently perish therein. This happens when the first summer rains are retarded and do not come at the usual time. The first good soaking rains of early summer usually bring out an emergence of beetles, but sufficient rain is required to penetrate deep enough to reach the cells in which the beetles are resting.

MACKAY.

A cane disease survey of the Farleigh district was recently carried out by the Division of Pathology of this Bureau, with a view to assisting farmers to bring about an improvement in the disease situation. Gumming disease was found on about fifteen farms, while Mosaic disease was found to be generally distributed, and was especially prevalent in the Habana area. Farmers who have gumming on their properties should on no account plant their own seed (an exception being made in the case of Q. 813), and they have been advised to this effect privately. Individual reports have also been made to the owners of farms on which the percentage of Mosaic disease is too high to permit of seed selection.

Mosaic disease is undoubtedly causing more loss in the Farleigh district than all other diseases combined, and a determined effort should be made to bring this disease completely under control. It has repeatedly been proved that in practically every case Mosaic may be completely controlled by seed selection, clean farms, and the up-rooting of all diseased stools as soon as the disease is observed. Experiments have shown that in susceptible varieties a loss of up to 60 per cent. in weight may be expected.

The gumming disease situation is serious, especially in view of the fact that the two new canes of promise in the Mackay area—viz., P.O.J. 2714 and S.J. 4—both appear quite susceptible. In a gumming resistance trial carried out in Bundaberg last year, the following results were obtained from S.J. 4:—

Stalks dead—95 per cent.
Stalks oozing gum—5 per cent.
Stalks apparently sound—nil.

It is quite apparent that gumming disease must be cleaned up before this variety, at least, can be grown successfully.

The following farms have been inspected twice, and on each occasion were found to be free from serious diseases, with the exception of a trace of Mosaic. In cutting plants, therefore, care should be taken to avoid the odd stools of Mosaic. Care should also be taken to avoid canes infected with red rot:—

T. A. Andrews, Nindaroo; G. Annable, Hill End; Aprile and Co., Dumbleton; W. Blackburn, Habana road, Richmond; C. Blake, Habana road; E. J. Bourke, Eimeo road; Chick and Ormes, Nindaroo; T. W. Daniell, North Side; G. Davey, Mount Pleasant; E. F. Dolby, North Side; M. Donahoe, Mielere; A. Edmonds, Nindaroo; G. Farquhar, Eimeo road; Fordyce and Sons, Richmond; P. Galitte, Dumbleton, Farleigh road; Hamilton and Smith, Glenalbyn; P. W. Hand, Coningsby; A. Hansen, Richmond; H. J. C. Hansen, Pioneer; C. A. Hodge, Mount Pleasant; J. H. Jameson, Eimeo road; P. Kirwan, Dumbleton; F. Knobel, Coningsby; V. E. Kreil, Dumbleton; McGowan and Son, Dumbleton; McLeod and Sons, Farleigh; J. R. Malcolmsen, North Side; H. J. Matthews, Mielere; W. May, Shoal Point; W. T. Millard, Hill End; Mrs. S. J. Pitt, Eimeo road; T. A. Powell, Dumbleton; C. H. Rasmussen, Pioneer Estate; W. J. S. Ray, Dumbleton; E. Ryan, Dumbleton; J. Sherry, Farleigh; G. Shinn, Eimeo road; Mrs. G. Simpson, Hill End; W. Skeele, Coningsby; W. Waddington, Eimeo road; Mrs. M. A. Wilkinson, The Cedars; J. H. Woodward, The Cedars; Harry Wright, Dumbleton.

DISEASE SURVEY OF THE BAUPLE AREA.

A cane disease survey of the Bauple area was carried out during March and April. Altogether eighty-seven farms were inspected, and of these there were only five on which no major disease was found. Mosaic disease was found on eighty-two farms, gumming disease on ten farms, and Marasmius root rot on three farms.

A comparison with the survey made in 1927 shows that the Mosaic disease situation has improved, but there is still room for a great deal of improvement. It has been proved in Queensland, and in many other countries, that in practically every case Mosaic can be controlled by (*a*) The selection of healthy seed cane; (*b*) the uprooting of diseased canes as soon as they appear; and (*c*) keeping the fields and headlands clean.

It should be a regular farm practice to inspect the young plant and ratoon cane at intervals and uproot any stool which has Mosaic disease. The fields should also be inspected before cutting any seed cane, and any diseased stools should be marked so that they will not be cut for seed.

With the object of assisting growers to obtain supplies of clean seed, the Bureau has compiled a list of farms on which there is not more than a trace of Mosaic, and no other major disease:—

J. Bates, T. Beattie, W. G. Cocking, Mrs. H. Dempster, W. A. Henderson, J. Herbener, A. Hurt, H. Jeppesen, L. Larsen, S. Lucas, R. A. Maike, A. Mergard, J. Nicolai, E. J. O'Mara, W. H. Phillips, P. Roth, F. S. Stringer, Mrs. L. Stringer, E. Sleaford, C. W. Volmerhouse, C. J. Wood—all of Bauple.

W. W. Cunnigham, J. Howie, B. Johnson, A. Smith, D. I. Strathford, P. B. and A. L. Scougall—all of Bauple road, Tiaro.

C. Kajewski and Mrs. M. Cavanagh, Gundiah.

As stated above, there is a trace of Mosaic on most of these farms, and, therefore, care should be taken to avoid the diseased stools at the time of cutting the cane for seed.

Although the amount of Mosaic has been reduced, the position with regard to gumming disease is alarming. This disease has now been found on ten farms, and, unless the required precautions are taken, it will assuredly continue to spread. Gumming disease is probably the most serious cane disease there is, and is certainly the worst disease in Southern Queensland, where it has caused a very great deal of loss, particularly in the Bundaberg district. There is no reason to believe that it will not cause as much, or greater loss, in Bauple.

The best known symptom of gumming disease is the oozing of gum from the cut ends of the stalk, but this is one of the last stages of the disease. The disease may be recognised in the field in its early stages by a particular kind of streak upon the leaves. These streaks may be up to a quartar of an inch wide, but are usually less, and vary in length from a couple of inches to almost the whole length of the leaf. Streaks may arise anywhere in the leaf, but generally commence at the margins, towards the tip of the leaf, and work downwards. The streaks follow the course of the large veins of the leaf and so run straight, and at an angle to the mid-rib. Their colour is yellowish-brown to yellow, usually dotted with a large number of small red blotches. Young streaks are best found after wet windy weather, but old dead streaks are common at this time of year; they are not found on the very youngest leaves.

Gumming is usually spread from plant to plant through scratches in the leaves during wet weather. It may be spread from field to field by flies and other insects, and on cane knives. Care should therefore be taken to sterilise cane knives in boiling water, or in 1 per cent. Phenyle, after having cut gummed cane; the bacteria which cause gumming disease have been found alive on cane knives six months after the knives were used. Farmers with gumming-free farms should not allow purchasers of seed cane to use their own knives when cutting cane in clean fields.

At certain times of the year it may be impossible to find any symptoms of gumming disease, although the field is known to be gummed. It is for this reason that once the symptoms have been found, all that field, and any cane within a quarter of a mile, are unsafe for seed unless of a highly resistant variety. Q. 813 is a resistant variety, and the ten farmers on whose properties this disease has been found are advised to plant this cane. If they desire to plant other varieties they should on no account plant their own seed, but should purchase it from one of the farmers in the above list.

Gumming was found mainly in the varieties D. 1135 and E.K. 28. E.K. 28 is one of the most susceptible varieties grown, and any farmer planting this variety should be doubly careful. If gumming is already on the farm this variety should be given up.

Every effort should be made to restrict the spread of this disease, and gradually eradicate it. There may be many varieties suitable to this district, but could not be introduced on account of their susceptibility to gumming disease.

SUGAR PRODUCTION—QUEENSLAND, 1928.

The Registrar-General (Mr. Geo. Porter, F.S.S.) has supplied the following statistics showing the result of the 1928 sugar crop:—

Thirty-five mills were again in operation during the 1928 crushing season, and the tabulation of details contained in returns received from each of these shows a total production of 520,620 tons of sugar net titre. This exceeds the estimate issued from this office on the 15th December last by 5,486 tons, and is 34,875 tons in excess of the production for the 1927 season, which was the previous record year.

As forecast in the estimate, production increased in the northern portion of the State, that is as far south as Mackay, including the sugar-growing areas in the Agricultural Divisions of Rockingham and Edgecumbe, but decreased in the southern portion, which includes the sugar-growing areas in the Wide Bay and Moreton Agricultural Divisions.

The following table shows the particulars of the crushing in the sugar-growing districts of the State during 1927 and 1928:—

Division.	TONS OF CANE.		TONS OF SUGAR AT 94 NET TITRE.	
	1928.	1927.	1928.	1927.
Rockingham ..	1,863,877	1,607,546	255.188	224,599
Edgecumbe.. ..	1,266,428	1.242,008	184,343	174,836
Wide Bay	566,494	644,325	75,850	78,757
Moreton	39.512	61,948	5,239	7,553
Total State ..	3,736,311	3,555,827	520,620	485,745

NOTE.—The above figures for tons of cane show the tonnage crushed at mills situated in the above districts, not the actual tonnage grown in each district. A table showing this information will be published later in the Agricultural Report. The total for State is, however, final.

It is estimated that 224,366 acres were cut for crushing in 1928 (mill estimate only, final figures not yet available), as against 203,748 acres in 1927.

There was an increase of 180,484 tons in cane crushed, and an increase in sugar made of 34,875 tons at 94 n.t., compared with the previous season.

It would appear that the increased production in 1928 was not due to heavier rainfall, as the undermentioned particulars would seem to indicate a lighter rainfall in 1928 than in 1927 throughout the sugar-growing districts.

Station.	District in which Situated.	Rainfall (Inches)	
		1927.	1928.
Innisfail	Rockingham	146·2	125·3
Mackay	Edgecumbe	89·3	84·9
Bundaberg	Wide Bay	66·0	41·0
Brisbane	Moreton	62·1	52·7

It is not claimed that the above stations are necessarily truly representative of the weather conditions prevailing in the sugar-growing areas in which each is situated, but they happen to be stations for which comparative figures are at the moment readily accessible. Furthermore, a true comparison of production and weather conditions would need to take into account the periods during which rain fell compared to time of planting, state of growth, and so forth.

The following table shows the tons of sugar made at 94 n.t. in each division of the State at five-year intervals since 1910. An examination of the figures will emphasise the expansion of the industry during that period.

Year.	Rockingham.	Edgecumbe.	Wide Bay.	Moreton.	Total.
1910	57,135	77,062	68,861	7,698	210,756
1915	58,677	44,156	32,951	4,712	140,496
1920	100,865	52,970	11,196	2,370	167,401
1925	216,755	171,511	85,360	11,959	485,585
1928	255,188	184,343	75,850	5,239	520,620

A further table is appended showing the percentage of production in each district to the total production of the State in five-year periods:—

Period.	Rockingham.	Edgecumbe.	Wide Bay.	Moreton.
1909-13	29·74	35·62	31·77	2·87
1914-18	39·70	33·78	24·13	2·39
1919-23	50·33	31·93	15·63	2·11
1924-28	48·55	33·58	15·88	1·99

This table shows the increased relative importance of production in the far North (Rockingham) to the total production for the State in the later periods, compared to 1909-13.

The yield per acre for 1928 season is estimated at 16.65 tons of cane, or 2.32 tons of sugar at 94 n.t., but as the mill estimates of acreage have been used in these calculations, the figures are liable to revision when final acreages are available.

The average tons of cane required to make 1 ton of sugar was 7.18, which is an improvement on previous years.

Comparative figures for five years are:—

Year.	To Each Acre Crushed.		Tons of Cane to Make One Ton of Sugar.
	Tons Cane.	Tons Sugar.	
1924	18·92	2·44	7·75
1925	19·36	2·56	7·55
1926	15·45	2·06	7·52
1927	17·54	2·38	7·32
1928	*16·65	*2·32	7·18

* Estimates only.

In addition to sugar made, the output of molasses from the mills during the year amounted to 16,873,372 gallons, which was disposed of as follows:—

	Gallons.
Sold to distilleries	5,103,471
Sold, &c., otherwise	573,350
Burnt as fuel	5,131,726
Food for stock	2,524,136
Used for manure	7,200
Held in stock	488,600
Run to waste	3,044,889

PESTS OF CITRUS.*

By ROBERT VEITCH, B.Sc., F.E.S., Chief Entomologist.

The citrus orchards of Queensland frequently suffer from severe insect infestations which are responsible for more or less serious losses to the orchardists. Some of the pests in question are practically cosmopolitan introduced insects, whereas others are native species which have turned their attention from indigenous wild host plants to cultivated orchard trees.

Among the more important citrus insects that are worthy of consideration in these notes are the bronzy orange bug, the "Maori" mite, the orange-piercing moths, the red scale, the citrus root-bark channeller, the Queensland fruit fly, the pink wax scale, and plant lice. Quite a number of other insects and allied pests of citrus exist in this State, but for present purposes attention will be confined to those just mentioned.

The Bronzy Orange Bug.

The insect known as the bronzy orange bug was recorded as far back as 1889 as a pest on citrus in the Toowoomba district. It has since been found injuring citrus in many different orcharding centres in Queensland, and it has also been recorded from the neighbouring State of New South Wales. It has in recent years been particularly abundant on the Blackall Range in this State.

The bronzy orange bug belongs to the Pentatomidæ in the order Hemiptera, and is known to science as *Oncoscelis sulciventris* Stål.

FEEDING HABITS AND NATURE OF INJURY.

As is the case with all the members of the order to which this pest belongs, feeding takes place by means of piercing mouth-parts. The epidermis or skin of the host plant is pierced, and through the rupture thus made the bug extracts the plant sap.

Field observations suggest that the bugs confine their attention to young and tender growth. They are found feeding on stems and leaves of young twigs and on flower and fruit pedicels, and they may also attack the young fruit.

The effect produced by the feeding of the bugs is typical of the class to which they belong. The attacked twigs (Plate 44) wilt and shrivel up, and the buds and young attacked fruit drop off. When the bugs are present in the numbers that have been recorded in certain orchards in the Blackall Range district, it is not difficult to appreciate the serious situation that may be created by the activities of this pest.

Oranges, mandarins, and lemons are all attacked by this serious pest. It is believed to be a native of Australia, and the suggestion has been made that it feeds on native species of Rutaceæ. Its association with native plants is, however, worthy of further consideration.

LIFE CYCLE STAGES AND LIFE HISTORY.

As this insect belongs to the Hemiptera it possesses what is known as an incomplete metamorphosis. In insects of this class the newly hatched wingless individual or nymph bears some slight degree of resemblance to the mature winged insect, into which it will gradually transform

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* Reprinted from "Pests and Diseases of Queensland Fruits and Vegetables," by Robert Veitch, B.Sc., F.E.S., and J. H. Simmonds, M.Sc., published by the Department of Agriculture and Stock, Brisbane, 1929.

Plate 44.—Orange Twig Attacked by the Bronzy Orange Bug (*Oncoscelis sulciventris* Stål).

during a period of growth that is accompanied by a series of moults. The life cycle of this species may thus be divided into three distinct stages; firstly there is the egg, followed by the wingless nymph, which after a series of moults produces the winged adult.

THE EGGS.

The green, shiny, spherical-shaped eggs (Plate 45, fig. A) are laid in rows in small masses, the number in each egg cluster being usually extraordinarily constant at fourteen. The eggs are laid on the foliage in summer anywhere on the tree, the under sides of the leaves being generally chosen for oviposition. The eggs pass through the usual incubation period, which is recorded by Tryon as being eight or nine days.

THE NYMPHS.

At the end of the incubation period the eggs hatch and the very small nymphs emerge. These are green in colour and are oval and somewhat convex in shape. They remain together without dispersing over the foliage, and it is believed that they either do not feed at all or, if they do, they partake but sparingly of food. A further noteworthy characteristic of these first-stage nymphs is the fact that they are very easily disturbed and will drop to the ground on the slightest provocation. The duration of this first stage is somewhat uncertain, but it is evidently brief and the nymphs then moult into the second stage.

The second-stage nymph resembles the first stage in its green colour, but it is very much flatter in shape and it clings extremely closely to the under surface of the leaf on which it is resting. It is by no means readily shaken from the host tree, and it further differs from the first stage in that it disperses over the foliage instead of the individuals of each egg cluster remaining close together. It is in this stage that the insect passes the winter in a state of inactivity. The nymph in this stage resembles the leaf so wonderfully in colour, and is so closely adherent thereto, that its presence even in very considerable numbers cannot be detected without careful examination. The second-stage nymphs, which have passed the winter in a state of inactivity, commence to crawl about in search of food late in August or early in September. By that time the citrus should be showing some tender young shoots, and it is on these shoots that the second-stage nymphs now commence feeding.

The third-stage nymph has its body decidedly flattened like the second-stage nymph. Observations by A. A. Girault in the Blackall Range district, in the spring of 1923, showed that by the end of September the great majority of the bugs that had hibernated as second-stage nymphs had moulted into the third stage.

The same records showed that by the end of October approximately half the bugs were in the fourth nymphal stage, while the remaining half were in the fifth. A few were still in the second and third stages, while one adult was found.

Nymphs in the fourth and fifth stages show distinct signs of the development of the wing-buds, and their colour scheme possesses certain features distinguishing these two stages from the three earlier ones.

The various nymphal stages are illustrated in Plates 45 and 46.

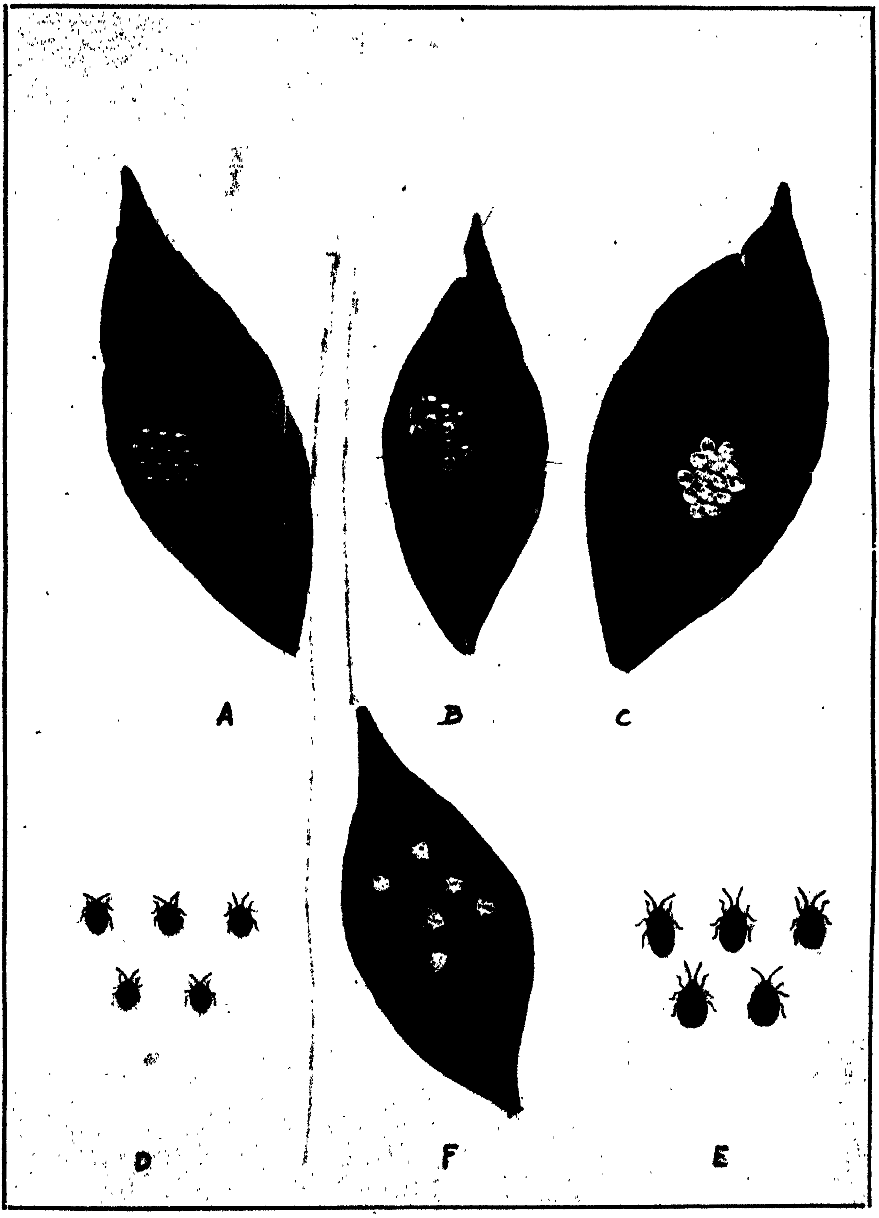


Plate 45.—The Bronzy Orange Bug (*Oncoscelis sulciventris* Stål).

Fig. A.—Egg cluster.
Fig. B.—Eggs hatching.
Fig. C.—Empty eggshells.
Fig. D.—Young nymphs.
Fig. E.—Somewhat older nymphs.
Fig. F.—Cast nymphal skins.

THE ADULT.

The adult bug (Plate 46) is just about an inch in length, and its colour scheme is somewhat appropriately described by its popular name of bronzy orange bug. There is little to distinguish the two sexes, although the male is generally considered to be smaller than the female. The under side of the abdomen in the female also possesses a median channel which does not occur in the male.

In the 1923 observations in the Blackall Range the first adults were found at the end of October, and from then on until midsummer there was a steadily increasing percentage of adults. The adults in both sexes are voracious feeders.

SUMMARY OF LIFE HISTORY AND HABITS.

The green spherical-shaped eggs are laid in clusters of fourteen on the under sides of leaves in summer, After an incubation period of some eight or nine days the eggs hatch, yielding small green nymphs which remain clustered together and apparently make little or no attempt at feeding. These then moult into the second-stage nymphs, which scatter over the host plant and pass the winter in a state of inactivity. In spring these second-stage nymphs commence to feed on the tender young shoots and then moult successively into the third, fourth, and fifth nymphal stages and finally transform to the winged adults, which mate and lay their eggs in summer, thus recommencing the life cycle. There is thus only one generation each year.

CONTROL MEASURES.

Much relief from this pest has been obtained by the adoption of the system of banging, accompanied by the cincturing or banding of the trees after banging. A padded mallet is used in order to sharply jar the various branches of infested trees, care being taken to ensure that the branches are not injured in the course of the operation. This work is best performed in spring-time, when third and fourth stage nymphs predominate. The nymphs in these stages will fall to the ground rather readily, and when that has been accomplished steps must be taken to prevent these wingless nymphs returning to the trees. This object may be achieved by building an earthen cone round the base of each tree, say 9 or 10 inches high, and then partially cutting the cone away so as to leave a steep face about 5 or 6 inches high up which the bugs cannot readily crawl. The return of the bugs may also be prevented by banding the tree with bands carrying sticky substances that will form a barrier which the bugs cannot cross. Tanglefoot has been used for that purpose. Some orchardists destroy the fallen nymphs by scorching them up with a blow-lamp, and this additional precaution ensures that there will be no possibility of return by some of the nymphs succeeding in crossing the bands or earthen cones. Bands are preferable to earthen cones.

The 1923 observations already referred to included spraying experiments, and these demonstrated the fact that, under the conditions then prevailing, spraying was not effective for the control of this insect.

Readers who desire further details with respect to this pest should consult the reports published by Tryon and Girault on the results of their investigations in 1923.

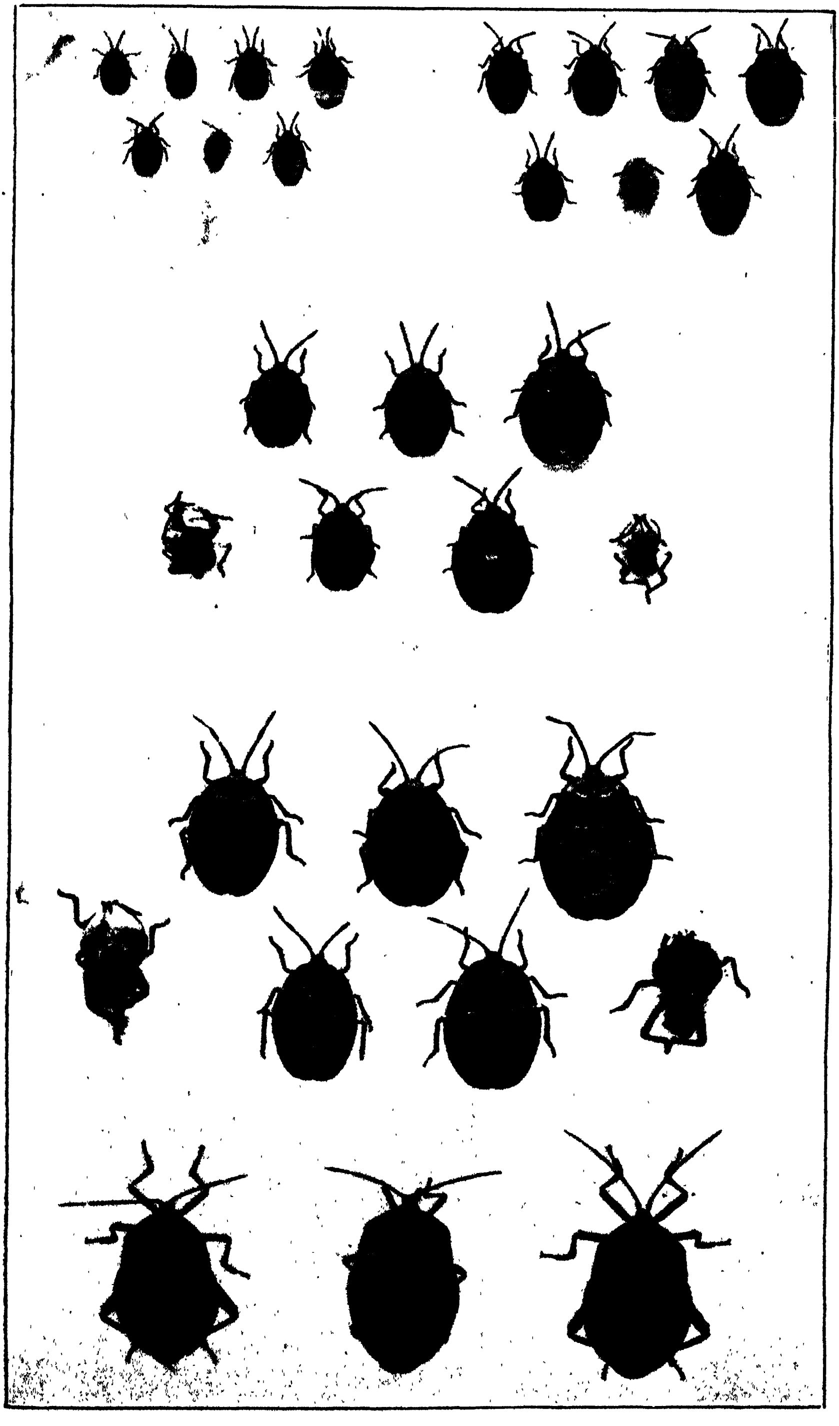


PLATE 46.—NYMPHAL STAGES AND ADULTS OF THE BRONZY ORANGE BUG (*Oncoscelis sulciventris* Stål).

The Citrus Rust Mite or "Maori" Mite.

Quite frequently oranges and lemons are found to be infested by a small mite known variously as the citrus rust mite, "Maori" mite, fruit mite, orange rust mite, or silver mite (*Phyllocoptes oleivorus* Ashm.). The oranges attacked by these mites acquire a characteristic dark-brownish tinge and are generally referred to in Queensland as "Maori" oranges.

No details are available with respect to the life history of this mite in Queensland, but in California some considerable information has been published thereon. Briefly it is to the effect that the extremely small circular and somewhat yellowish eggs are laid on the fruit or foliage either singly or in small clusters. These eggs hatch out after an incubation period of about a week in the warmer weather, and by a succession of moults the mites attain full size in some two or three weeks. Their breeding season lasts from spring till late in autumn, and thus a large number of broods are produced every year.

The individuals of this species are extremely small, light-yellowish, four-legged mites; they are indeed so small that they can be observed only by means of a lens, being invisible to the naked eye. Their presence, therefore, can most easily be detected by the effects produced by their feeding. Both the immature forms and the adults of the citrus rust mite pierce the oil-cells and feed on the oil. The bark, the foliage, and the rind of the fruit are all attacked in the search for food, and as the mites sometimes occur in enormous numbers they can cause appreciable damage. As a result of their presence on the fruit, this is stained the brown or dark brown that is characteristic of the "Maori" orange. The appearance of the fruit that has been discoloured by this infestation is undoubtedly by no means attractive, but the quality of the fruit is not necessarily impaired.

With regard to control, this may be effected by spraying with a weak solution of lime sulphur or by dusting with sulphur. Citrus rust mite, however, is generally quite a minor pest of citrus.

The Orange-piercing Moth.

The orange-piercing moth (*Othreis fullonica* Linn.) and two other allied moths of similar feeding habits—namely, *Mænas salaminia* Fab. and *Argadesa materna* Linn. (Plate 49)—frequently appear in very large numbers in citrus districts during the autumn months. They are large handsome moths possessing the exceptional power of being able to pierce the rind of fruit and to extract the juices through the punctures thus made. The sucking or sipping of juices is, of course, quite the normal procedure in moths, the abnormality in this case being the power to pierce the rind of the fruit in order to obtain fruit-juice. An examination of the proboscis of one of these moths readily discloses the fact that it is highly specialised to permit of this habit, so unusual in moths. A discussion of the details of the modification of the proboscis, however, is quite unnecessary in these notes, although it is of great scientific interest.

The moths themselves are large, exceptionally handsome species that are well illustrated in the accompanying photographs (Plates 47 and 49). The larva of *Othreis fullonica* is quite in keeping with the moths so far as appearance is concerned, for it is a particularly handsome caterpillar (Plate 48).

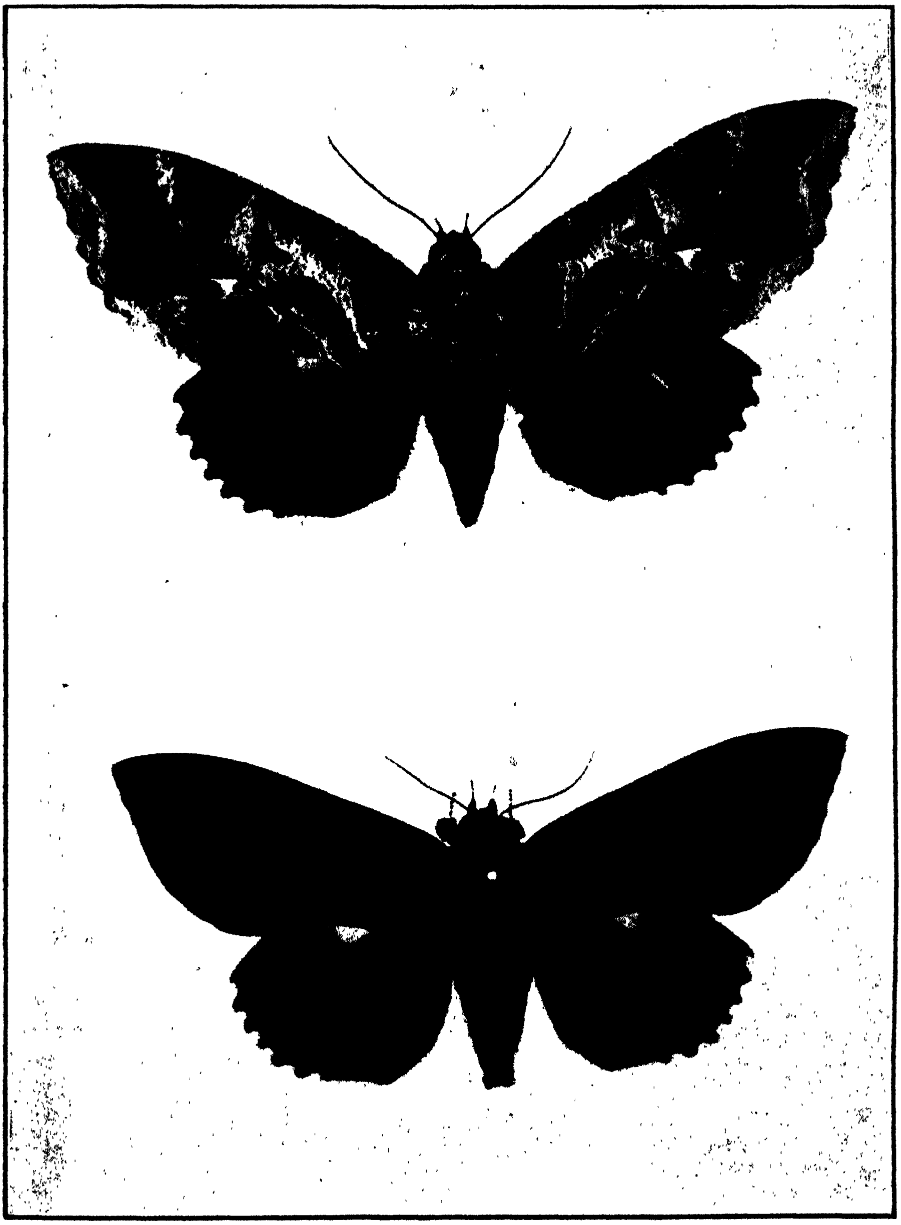


Plate 47.—The Orange-piercing Moth (*Othreis fullonica* Linn.).
Male and Female Moths.

The larvæ feed on various native plants, and are themselves of no economic importance except by virtue of the fact that they develop into the moths that attack fruits of certain cultivated plants. The fruit-piercing moths have been recorded as attacking citrus, bananas, and mangoes. During the autumn of 1927 they were particularly destructive throughout coastal Queensland.

For the control of this pest, perhaps the best that can be done is to capture the moths at a lure. For this purpose over-ripe bananas, of which they are particularly fond, may be used, and these should be placed in suitable spots, visited daily after dark, and the moths feeding on them captured and destroyed. Small pieces of water-melon have also been strongly recommended as a lure; these have to be similarly visited and the moths destroyed. To obtain maximum results from this operation it should be commenced very early in the season.

If it is practicable to do so, the native plants on which the caterpillars of these moths are feeding should be destroyed.

The Red Scale.

The red scale (*Chrysomphalus aurantii* Maskell) is without doubt one of the most serious pests of citrus in Queensland, and indeed it may even be regarded as worthy of classification among the world's most destructive citrus insects. It is now practically world-wide in its distribution, at least so far as the tropical and semi-tropical regions are concerned. As is not unusual in the case of insects that have become widely distributed throughout the world, there is some considerable uncertainty with respect to its native home. It is not regarded, however, as being indigenous to Australia, and it would seem that evidence exists in favour of the belief that it originally came from China or elsewhere in the Far East.

This scale does not confine its attention to citrus, but it is as a pest of citrus that it has acquired its unenviable reputation. Other plants attacked include apple, pear, quince, plum, fig, olive, coconut, and rose. As already indicated, however, it is not a pest of importance except on citrus.

The effect of red scale, if allowed to multiply without the check administered by the application of control measures, is usually very serious. It attacks all parts of the tree, i.e., the foliage, the fruit, and the branches, and when a tree is severely infested many of the leaves will be shed and many branches killed. A tree that is so affected is naturally of little profit to an orchardist, and what fruit is produced is unattractive and frequently unsaleable. This scale insect does not excrete honeydew, and hence its presence is not accompanied by the occurrence of fumagine or sooty mould. Fumagine is the term applied to a fungus that grows on the honeydew or sweet substance excreted by certain species of scale insects. Fumagine does not attack the plant tissue, and apart from the unsightly appearance produced it is of relatively little consequence.

The red scale is viviparous—i.e., no eggs are laid and the young appear as very small larvæ. These are sulphur yellow in colour and possess three pairs of legs, thus enabling them to move about in search of a suitable spot at which to settle down. When that has been obtained they commence to form the scale covering which gives these insects their popular name. Under these scales the insects develop to maturity, the

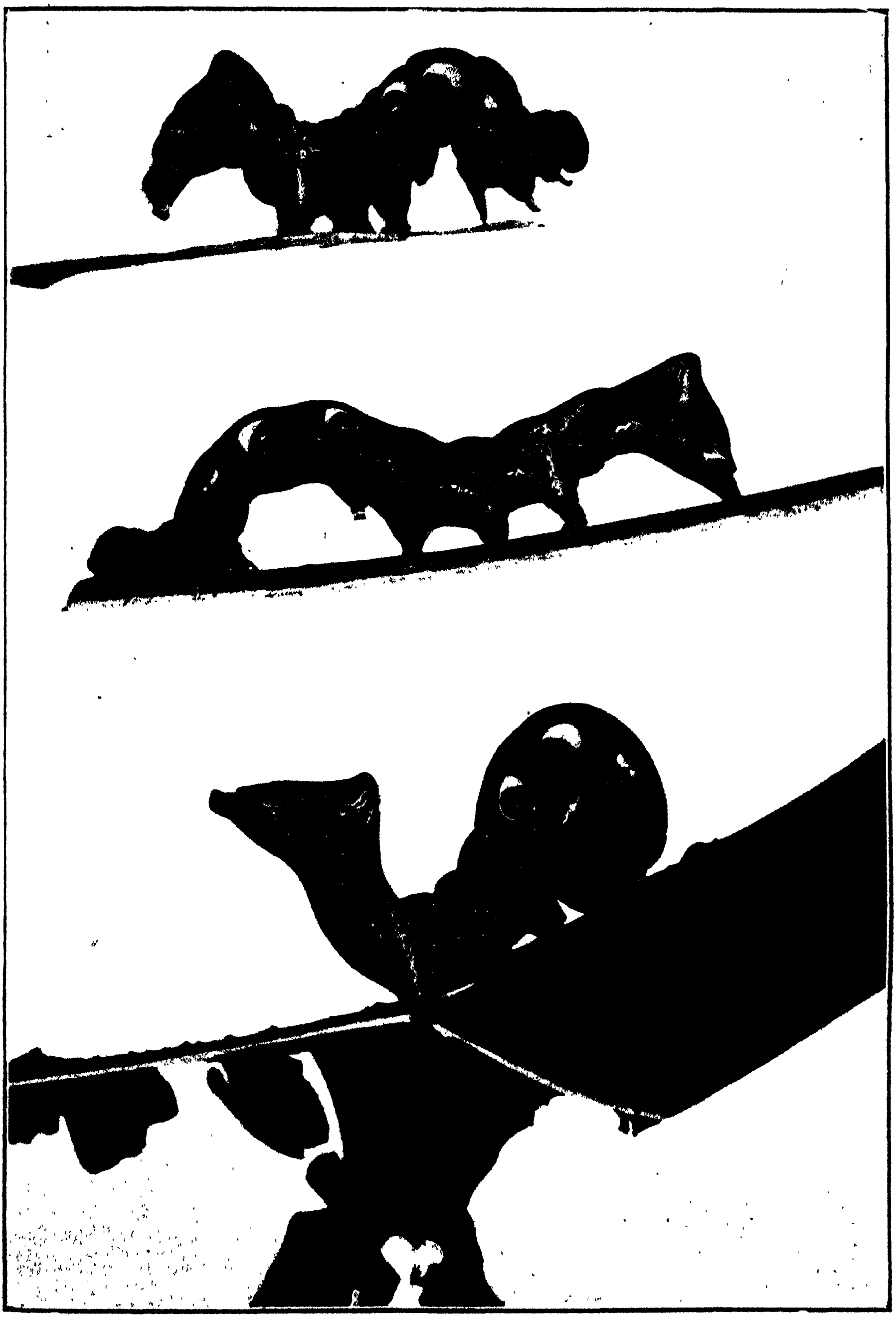


Plate 48.—Larvæ of the Orange-piercing Moth (*Othreis fullonica* Linn.).

female adults becoming rather degenerate legless and wingless insects. The adult males are totally different in appearance, and possess a pair of wings and three pairs of legs by means of which they are able to travel from tree to tree in search of mates. Although the power of flight of the winged male is slight it is frequently transported long distances by wind. The scale of the full-grown female is about $\frac{1}{12}$ inch or slightly more in diameter and is distinctly circular in shape. It is transparent, and this fact allows the red colour of the female insect to be seen quite clearly, hence the popular name of the red scale. The scale covering the immature male insect is smaller than the scale of the female, and is elongate in shape rather than circular.

With respect to control, fumigation with hydrocyanic acid gas can be strongly recommended. Fumigation is discussed in some detail in the chapter dealing with insecticides. Spraying is also adopted for the control of this pest, resin wash and miscible oils being used for that purpose.

The Citrus Root-bark Channeller.

Like the notorious banana weevil borer, this citrus pest belongs to the Curculionidæ. It was technically described in 1920 as *Decilaus citriperda* H.T., but it is more commonly known among orchardists as the citrus root-bark channeller. It appears to have first become the subject of attention as far back as 1908, and since that date it has frequently figured in routine inquiries regarding the control of injurious insects. Reference to its attacks on citrus appears to come mainly from the Blackall Range, although recently a number of inquiries have been received from elsewhere on the North Coast.

Nature of Injury.

The examination of an attacked tree readily provides evidence of the nature of the injury if the base of the stem and the roots in proximity thereto are inspected. It will then be seen that a number of channels have been excavated at the base of the stem and on the surface of the roots, and that on the latter the channels may extend outwards for several feet from the base of the stem. In the case of an old attack the channel is exposed by the decay of the thin layer of bark that originally covered it, but in a more recent infestation the outer layer of the bark is still present, and on that account the extent of injury may be somewhat masked. It may be further observed that in many of the older attacks the infested trees have attempted to heal the wounds, and these efforts have in some instances been attended with a certain measure of success.

The inspection of infested roots has so far shown that, although frequently quite a considerable number of individual channels may exist in the one root, they do not run into each other and ringbarking is not associated with infestation. This is a somewhat fortunate feature in the feeding habits of the citrus root-bark channeller, and it rather mitigates the seriousness of its presence in an orchard. Were a ringbarking effect typical of its presence it would be a more serious pest than it is. Nevertheless the infestation on a root may frequently be so very considerable as to practically completely destroy it, and obviously when a number of roots of one tree are so attacked the growth of the tree and the production of fruit must be very seriously retarded.

TREES ATTACKED.

The roots of both orange and mandarin trees are attacked, and it also seems probable that this pest feeds on the roots of some native species of plant or plants. This supposition has not yet been confirmed, but nevertheless the citrus root-bark channeller is believed to be a native species of weevil that has transferred its attention from a native host plant to cultivated citrus trees.

The information accumulated to date rather tends to support the belief that this weevil favours the older trees, and that young citrus, if attacked at all, is but slightly infested. It has also been thought that, in the older trees, lack of vigour may be a predisposing factor to severe infestation; this lack of vigour may be the result of growth under unfavourable circumstances such as unsuitable soil conditions, lack of attention, or unfavourable seasons. The whole question of the incidence of infestation appears, however, to warrant further attention.

LIFE CYCLE STAGES.

Beetles possess four distinct stages in their life cycles, each of these stages having very definite functions to perform; they are the egg, larva, pupa, and adult or beetle. The second stage, i.e. the larva or grub, is the one in which the damage is done to the roots of citrus by the particular species at present under discussion. It is creamy white in colour, legless, and otherwise rather featureless, and measures about ⅓ inch in length. The pupa is characteristic of its class, and in it the legs, wings, and head of the future beetle can be clearly seen. The beetle itself is a typical black weevil measuring roughly about ¼ inch in length.

CONTROL MEASURES.

In attempting to control this pest the orchardist may adopt either or both of two courses. He may endeavour to stimulate the growth of the infested trees, thus enabling them to better resist and repel the infestation, or he may attempt to destroy or drive off the weevils responsible for the damage.

If this pest, as there is good reason to believe, is more commonly met with in the older trees that are in a state of decline as a result of adverse conditions other than root-bark channeller infestation, then the adoption of the first-mentioned alternative seems worthy of serious consideration. Anything that would tend to eliminate these unfavourable conditions would thus check the tree's decline in vigour, and would therefore help to alleviate the insect infestation. If the trees are suffering from unfavourable soil conditions, efforts should if practicable be made to counteract these adverse soil conditions; if cultural practices have been faulty these should be rectified; and if scale infestation is heavy that should be remedied by fumigation or by suitable spraying. Even if the old trees that are attacked are otherwise perfectly healthy, their growth should be stimulated to enable them to withstand the attack.

The alternative to these measures is to attempt to destroy the insects by the adoption of some form of soil fumigation. It must, however, be pointed out that so far no satisfactory system of soil fumigation has yet been demonstrated for the control of this pest, and all that can be done is to record lines along which possible experiments might be conducted. For this purpose paradichlorobenzene seems worthy of some investigation, and indeed preliminary trials with this fumigant have already been carried out. These, however, will have to be followed up before any definite expression of opinion is possible. It will be necessary to determine, firstly, just how effective that fumigant really is for this particular purpose, secondly, what are the minimum doses that can produce the required results, and, thirdly, just how safe it is for application to citrus trees. It may be added that paradichlorobenzene has been demonstrated to be a very useful fumigant for a number of soil-infesting insects.

The Queensland Fruit Fly.

The Queensland fruit fly (*Chætodacus tryoni* Froggatt) is frequently the cause of very considerable losses in citrus fruits, the losses occurring mainly in the late and early crops. The eggs are laid in small punctures in the fruit, and the maggots hatching therefrom feed voraciously, thus obviously rendering the fruit valueless for marketing. This highly destructive insect has already been dealt with in very considerable detail in Chapter VII. Its life history and control are discussed therein, and further reference to this pest is unnecessary in these notes as the full details can be obtained in the chapter mentioned.

The Pink Wax Scale.

This very conspicuous scale insect (*Ceroplastes rubens* Maskell) is a common pest throughout coastal Queensland on mandarins, oranges, and lemons, and it is also one of the pests most frequently associated with the mango. The fully developed scale is slightly more than ¼ inch in length and is pink in colour. What is seen by the orchardist is not really the scale insect, but is the very heavy hemispherical coating of wax with which it has covered itself. Beneath that protective layer is the actual insect; the young insects belonging to this species do not of course possess this heavy protective covering, but they gradually acquire it during the process of growth. This species was originally described from specimens obtained in Australia, but, in spite of that fact, some authorities do not consider it to be a native of this country.

The feeding of this insect on the foliage of the trees which it infests is always associated with the presence of what is known as fumagine or sooty mould. The pink wax scale secretes a sweet sugary substance, and on this secretion there grows a black fungus which gives to the attacked tree an unsightly, dirty appearance. (This fungus is further discussed at the end of this chapter.)

Although the pink wax scale is not nearly so injurious to citrus as the red scale, it is nevertheless decidedly harmful, partly because of the actual weakening of the attacked tree and partly because of the production of the unsightly fumagine referred to. Steps should therefore be taken to control this pest, and for that purpose spraying with soda-wash or resin-wash can be recommended.

The spraying should be done at a time when large numbers of young insects are hatching out, because, as already indicated, the young scales have little or no protective covering, and they are then much more vulnerable than they will be at a later stage in their development.

The preparation of resin-wash has already been dealt with in Chapter 3. The soda-wash may be prepared in accordance with the following formula:—1¼ lb. of washing soda to 4 gallons of water. Only clean, fresh washing soda should be employed when mixing this spray, otherwise if old washing soda is used considerable damage may be done to the foliage of the treated trees.

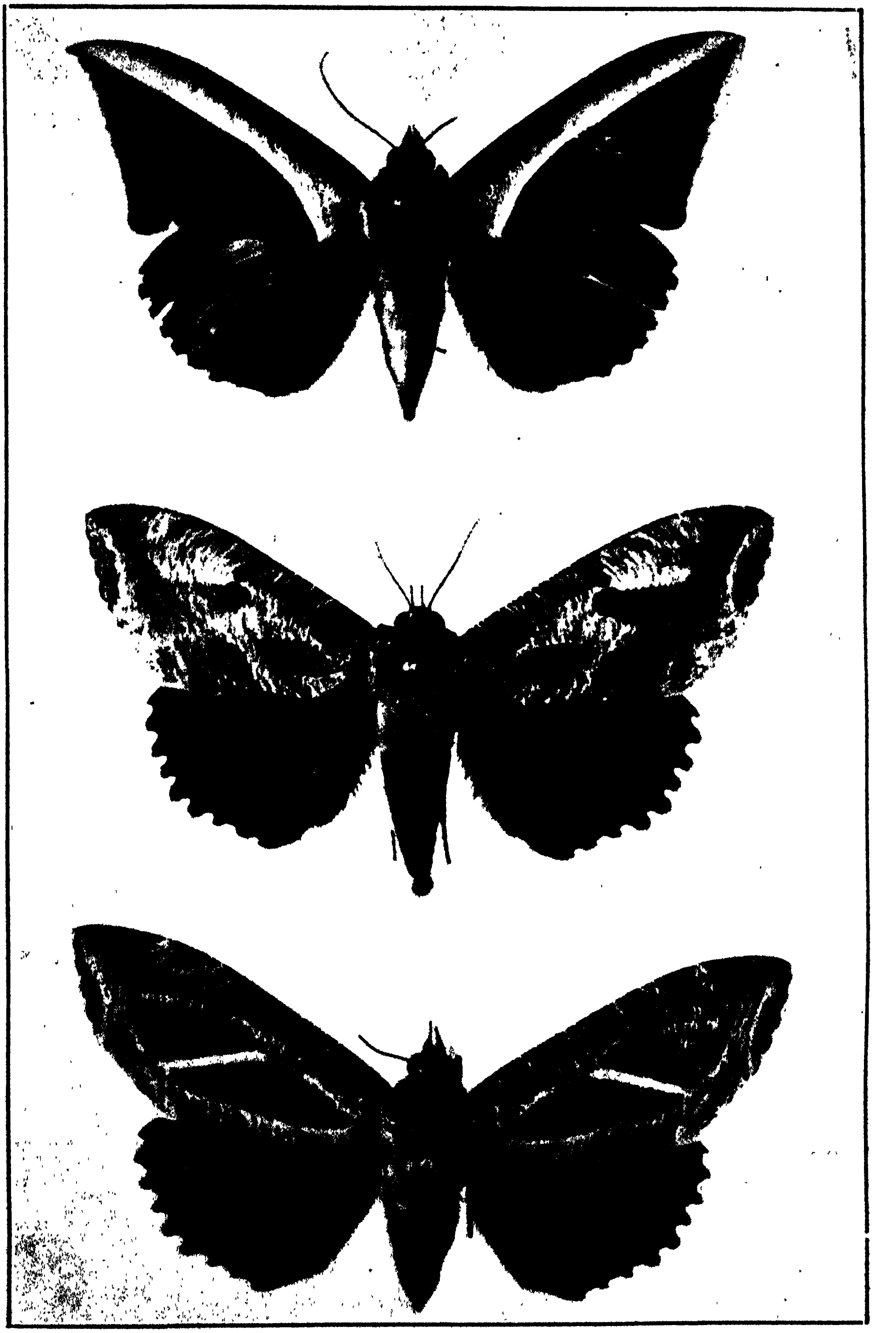


Plate 49.—*Mœnas salaminia* Fabr.
Argadesa materna Linn. (Male and Female.)

Aphis.

Plant lice or aphids not infrequently attack the tender young twigs of citrus trees, and as a result of their feeding thereon the leaves curl up and the twigs shrivel and die if the infestation is allowed to continue. Frequently the attack is confined to a few twigs and it sometimes disappears quite suddenly. Should that not be the case, the plant lice may be controlled by spraying with nicotine sulphate.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF JUNE IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING JUNE, 1929, AND 1928, FOR COMPARISON.

Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.	
	June.	No. of Years' Records.	June, 1929.	June, 1928.
North Coast.	In.		In.	In.
Atherton	1·62	28	1·29	0·28
Cairns	2·79	47	2·60	0·58
Cardwell	2·05	57	1·46	0·94
Cooktown	2·00	53	2·02	0·35
Herberton	1·04	42	0·87	0·24
Ingham	2·36	37	1·60	2·14
Innisfail	7·11	48	4·09	1·73
Mossman	2·05	16	1·76	0·77
Townsville	1·30	58	2·03	0·48
Central Coast.				
Ayr	1·41	42	3·24	0·75
Bowen	1·61	58	1·81	0·06
Charters Towers	1·29	47	1·76	0·22
Mackay	2·68	58	2·41	1·43
Proserpine	3·41	26	2·49	1·17
St. Lawrence	2·42	58	6·87	0·96
South Coast.				
Biggenden	2·18	30	1·97	4·73
Bundaberg	2·83	46	3·36	5·25
Brisbane	2·78	78	4·40	2·22
Caboolture	2·64	42	3·45	2·56
Childers	2·51	34	1·38	4·65
Crohamhurst	4·43	36	4·66	2·77
Esk	2·21	42	3·05	2·79
Gayndah	1·87	58	1·07	2·87
Gympie	2·67	59	2·63	3·88
Kilkivan	2·17	50	0·97	2·85
Maryborough	3·01	57	2·55	5·74
South Coast—continued:				
Nambour	3·64	33	3·08	2·88
Nanango	2·08	47	1·38	2·03
Rockhampton	2·19	42	10·39	1·27
Woodford	2·86	42	3·52	2·40
Darling Downs.				
Dalby	1·71	59	1·15	1·69
Emu Vale	1·49	33	2·73	1·60
Jimbour	1·74	41	1·41	1·89
Miles	1·86	44	0·75	1·45
Stanthorpe	1·92	56	1·65	2·60
Toowoomba	2·44	57	1·38	1·88
Warwick	1·78	64	1·91	1·59
Maranoa.				
Roma	1·66	55	0·61	1·70
State Farms, &c.				
Bungeworgorai	1·55	15	0·43	1·84
Gatton College	1·88	30	1·47	1·95
Gindie	1·48	30	2·91	1·19
Hermitage	1·90	23	1·78	1·46
Kairi	1·47	15	1·42	0·19
Mackay Sugar Experiment Station	2·37	32	2·54	1·11
Warren	2·29	14	0	0

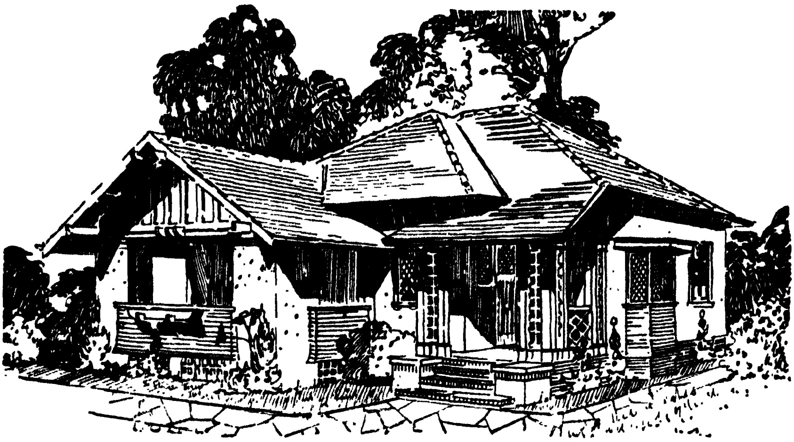
GEORGE G. BOND,
Divisional Meteorologist.

QUEENSLAND SHOW DATES, 1929.

Nundah: 3rd August.
Redcliffe: 9th and 10th August.
Royal National: 12th to 17th August.
Crow's Nest: 21st and 22nd August.
Wynnum: 30th and 31st August.
Goombungee: 30th August.
Imbil: 4th and 5th September.
Zillmere: 7th September.
Stephens: 14th September.
Malanda: 18th and 19th September.
Pomona: 18th and 19th September.
Beenleigh: 20th and 21st September.
Rocklea: 28th September.
Kenilworth: 28th September.
Enoggera: 5th October.
Pine Rivers: 15th and 16th November.

FIBROLITE BUNGALOW

Erected at the Brisbane Exhibition



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Miscible Self-Emulsifying Red Spraying Oil

½ gal. tins	.. 4/-	1 gal. tins	.. 7/-
4 gal. tins	4/9 gal.	40 gal. barrels,	4/3 gl.

Harola

The Perfect Spreading Lime Sulphur Solution

½ gal. tins	.. 2/6	1 gal. tins	.. 4/-
4 gal. tins	2/3 gal.	40 gal. barrels,	1/9 gl.

Bordeaux Mixture

A very fine Powder with the Ingredients in Correct Proportion

1 lb. packets	.. 1/9	25 lb. packets	1/3
5 lb. packets	1/5 lb.	50 lb. packets	11d. lb.

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1 lb. ..	.. 2/-	4 lb. packets	1/6 lb.
48 lb. cartons	1/3 lb.	96 lb. cases	1/2 lb.

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QUEENSLAND
LIMITED

DISEASES OF CITRUS.*

By J. H. SIMMONDS, M. Sc., Plant Pathologist.

The diseases dealt with in this chapter are black spot, melanose, blue mould, scab, exanthema, die back, collar rot, and sooty mould.

Black Spot.

Black spot is a fruit disease to which most commercial varieties of citrus are subject. Old trees of the common seedling orange are probably the most seriously affected, and with these black spot is often responsible for considerable fruit disfigurement.

SYMPTOMS.

An indication of the presence of black spot often overlooked is a somewhat scanty brown spotting of the leaves which may be present at various times throughout the year. The characteristic spotting of the fruit takes place when the latter is approaching maturity, and appears first as scattered, minute, pink or reddish-brown spots on the surface of the rind, usually with a definite and somewhat darker margin. These enlarge to a more or less circular area $\frac{1}{16}$ to $\frac{1}{8}$ inch in diameter. The central portion becomes shallowly depressed, and as the spot matures this region assumes a greyish colour, leaving only a narrow rim of the original brown.

If conditions are suitable, the fruiting bodies of the fungus causing the disease may be developed even in the early stages of spot formation. These make their appearance on the depressed areas in the form of minute, translucent, dome-shaped blisters which gradually darken until they become sooty black in colour. The small, grey depressed spot with a narrow brown rim, and studded on its surface with black points just visible to the naked eye, is quite characteristic of this disease. (Plate 50.)

Under conditions favouring the growth of the fungus, a diffuse browning may spread out from the margin of the spots, and, if the latter are numerous, coalescence and spreading may take place until a large proportion of the skin shows a brown and somewhat shrunken area over which are speckled the black points of the fruiting bodies. This latter effect is seen more especially on ripe fruit after storage, or on fruit which has fallen to the ground.

CAUSE.

Black spot is caused by a fungus (*Phoma citricarpa*) first described by McAlpine, the Victorian Plant Pathologist, in 1899. The fruiting bodies arise just beneath the surface of the depressed spots, and take the form of small flask-shaped receptacles known as pycnidia. It is the black walls of these pycnidia which show up as the characteristic black points mentioned above. From the inner lining of these structures are produced numerous minute, clear, oval spores which are extruded through an opening at the apex and thus serve to spread the disease.

The spotting resulting from an attack of this fungus does not usually appear until the fruit is commencing to colour, and becomes increasingly prevalent as the weather becomes warmer. For this reason greatest loss is sustained in fruit held for a late market.

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* Reprinted from "Pests and Diseases of Queensland Fruits and Vegetables," by Robert Veitch, B.Sc., F.E.S., and J. H. Simmonds, M.Sc., published by the Department of Agriculture and Stock, Brisbane, 1929.

EFFECTS.

Although black spot does not usually penetrate beyond the outer region of the rind leaving the edible qualities unaffected, it nevertheless produces disfigurement sufficient to cause considerable reduction in price. After storage the spotting may spread, to give rise to a larger brown area of a more serious nature.

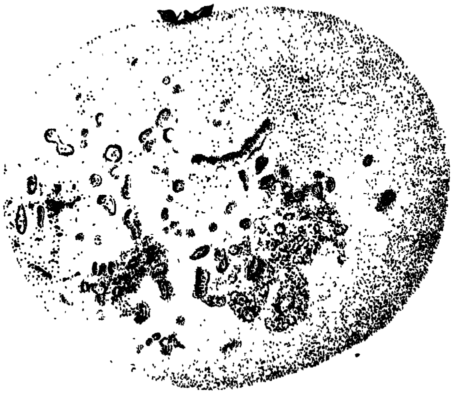

FIG 1

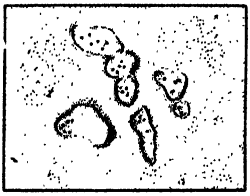

FIG 2.

W. Helmsing 1928.

PLATE 50.

Fig. 1, Black Spot on Orange. Fig. 2. Individual spots enlarged to show the black points of the pycnidia.

Spotted fruit becomes more easily attacked by blue mould and other rot-producing fungi, with the result that the keeping qualities are further impaired.

In the orchard it will be found that fruit affected with black spot will not hang on the tree when ripe. The loss from fruit falling off on this account is often considerable.

CONTROL.

1. It is very noticeable that black spot is often present to a greater extent in an old orchard or one showing signs of neglect. For this reason steps should be taken by satisfactory manuring and cultivation to get the trees in a state of healthy vigorous growth. All dead and sickly wood should be pruned out.

2. As has been pointed out above, the fruiting bodies of the fungus may develop on fallen fruit, and these should therefore be carefully picked up and destroyed by fire or burying.

3. It is possible to control the disease by spraying with Bordeaux mixture. Experiments are now being conducted to determine for Queensland conditions the most effective times at which to make applications. In the meantime the following schedule is suggested:—

Bordeaux of 4-4-40 strength, or Bordeaux 4-4-40 + 1% of oil emulsion—

(1) As soon as the fruit have set;

(2) About one month to six weeks later;

(3) If black spot has been serious previously, another application just prior to the February rains.

Fruit on the sunny side of the tree is more subject to attack, and special attention should therefore be paid to this region.

Melanose.

Melanose is a trouble which is of rather frequent occurrence in some older orchards, where it may be of more serious consequence than black spot. The orange, mandarin, and lemon may all be affected.

SYMPTOMS.

The disease appears on leaves, twigs, and fruit, though it is on the latter that it becomes most conspicuous. The characteristic lesions on the fruit consist of small brown, more or less circular dots scattered over the surface. The individual spots vary in size from minute specks up to about $\frac{1}{30}$ inch in diameter. They appear at first merely as a surface stain, but later become slightly elevated and somewhat fissured diagonally or round the margin so that a melanose-affected fruit is decidedly rough to the touch. The spots may be sparsely scattered or abundant, and are often seen to be arrayed in rings or lines (Plate 51).

When numerous a coalescence may take place so that a more or less continuous superficially fissured area is formed. In this latter condition melanose resembles to a certain extent both "Maori" and exanthema. A typical "Maori" orange, however, is usually of more uniform colouration, and is smooth to the touch, while a fruit affected with Exanthema, although rough usually, has the rind of the affected region more definitely hardened often with resultant splitting.

The spotting on the leaves resembles in general appearance that on the fruit except that it is black rather than brown in colour. Leaves badly affected may be puckered and otherwise deformed by the presence of the disease. Young twigs and water-shoots may be attacked in a similar manner, and if infection is severe leaf-fall may result.

Examined microscopically, the lesions are seen to consist of two or three layers of brown dead cells, which in the later stages become elevated by the development of a layer of corky tissue beneath. The unequal tensions resulting from the hardening of the surface layers, and growth of the tissue surrounding, results in the fissuring mentioned above.

CAUSE.

The symptoms displayed by this disease are the same as those of the melanose of Florida, which has been shown to be caused by the fungus *Phomopsis citri*. A fungus closely resembling this has been isolated from a stem-end rot of lemons and from dead twigs in Queensland, and it is probable that the two diseases are identical.

Some growers have been in the habit of designating the disease as "false" melanose. This name was applied by McAlpine many years ago to a similar disease then occurring in New South Wales, whose presence he attributed to an entirely different fungus. The term "false" should be avoided when speaking of the disease which occurs in Queensland, since it often leads to confusion.

The fungus *Phomopsis citri* is not a very active parasite, and the melanose lesions formed by it are usually greatly restricted in extent, the fungus itself quickly losing its activity. It does, however, maintain a more active existence on dead twigs and branches, and it is here that the fruiting bodies are produced. These take the form of small depressed flask-like receptacles or pycnidia developed just below the surface of the bark, where they form minute pimple-like pustules the apex of which becomes split to liberate the spores developed within (Plate 51).

The spores are small, clear, oval cells which are extruded in a mass during damp weather. They are then washed by rain and dew from the dead twigs on to young and tender shoots or fruit, where they germinate if conditions are suitable, and infect the living tissue sufficiently to cause the spotting described above. The ring-like arrangement of the spots so characteristic of melanose is due to the lodgment of a number of spores in a water-drop, when they tend to spread out to the margin and there come to rest.

Examination of a tree badly affected with melanose will almost invariably reveal the presence of dead wood. A vigorously growing tree free from dieback is seldom affected. For this reason it is usually the older or neglected orchards that suffer most. It is only young shoots and fruit which are susceptible to infection. Growth which has hardened off is immune. Rain is necessary for the spread of the disease and the germination of the spores. This is always liable to occur in sufficient quantity during the spring and early summer months.

CONTROL.

To control melanose the object is to reduce as far as possible the source of infection and to keep the young growth covered with a fungicide during its susceptible period.

1. Prune out all dead twigs and branches, and practise a system of fertilising and good cultivation with a view to inducing strong vigorous growth.

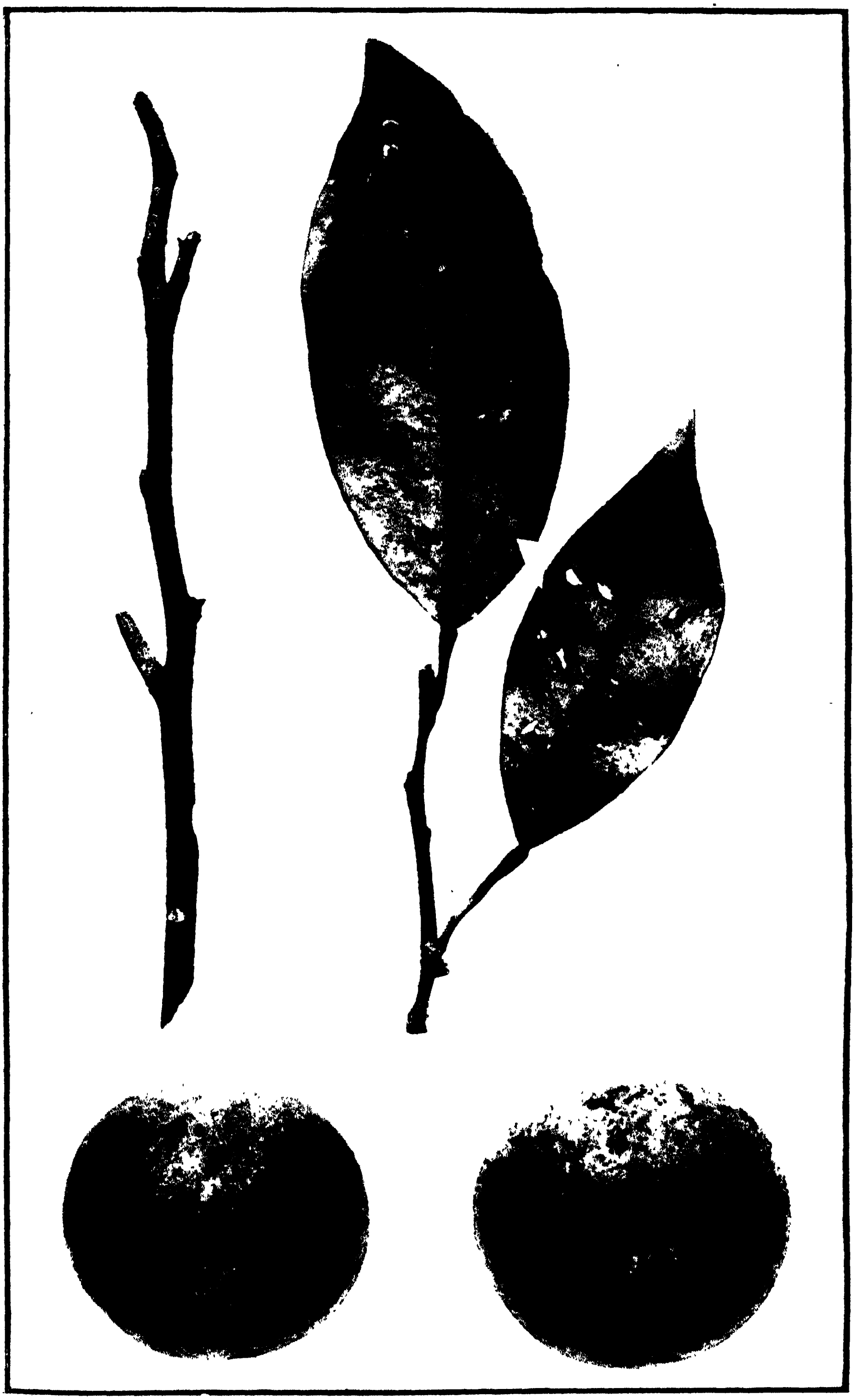

Plate 51.—Typical Melanose symptoms on leaf and fruit of the Orange. Also dead twig bearing pycnidia of *Phomopsis citri.*

2. Spray with Bordeaux mixture of 4-4-40 strength, or Bordeaux 4-4-40 + 1% oil emulsion—

   (*a*) Immediately the fruit has set;

   (*b*) One month to six weeks later, or oftener if the weather conditions are exceptionally wet.

Scab.

Scab is a disease to which lemons are more particularly subject, their leaves, young twigs, and fruit being affected. During wet seasons most varieties of mandarin may also be attacked, though in this case the foliage may suffer to a greater extent than the fruit. The sweet orange is apparently immune.

SYMPTOMS.

Only young growth is liable to infection. When the leaves commence to harden off and the fruit to mature they become resistant. The disease appears first on the young soft foliage as small, scattered, light yellowish green spots with a somewhat diffuse margin. The affected area becomes depressed from above downwards or *vice versa* so that a small conical projection is formed on the lower or upper surface of the leaf. At the apex of this elevation a small mass of brown corky tissue is developed which gives the characteristic scabby appearance to the leaf. The corky excrescences are also commonly formed on the leaf surface without previous leaf indentation. They vary in size from minute brown specks to rough wart-like scabs $\frac{1}{16}$ to $\frac{1}{8}$ inch in diameter. Large scabby areas may be produced from these by coalescence. Distortion and stunting often result owing to the inability of the leaf affected with scab to develop evenly (Plate 52). The lesions on the twigs and on mandarin fruit resemble in the main those on the leaf. On the lemon fruit the actual scabs are of much the same appearance except that they are as a rule somewhat larger. The effect is, however, often accentuated by the growth of the rind tissue surrounding a scab lesion into a prominent conical projection bearing the scab at its apex. Considerable malformation is produced by this means.

Scab is due to the presence of a fungus (*Sporotrichum citri*) whose fruiting stage appears as a delicate greyish mould covering the surface of young scabs.

CONTROL.

As pointed out above, the scab fungus infects only young immature tissue. Certain conditions of temperature and moisture are also necessary for its development. These conditions are always liable to occur in the Queensland spring weather, and if scab is present in the orchard steps should be taken to control it by means of spraying. The following applications may be made for this purpose:—

(1) Spray with Bordeaux mixture of 6-4-40 strength, or Bordeaux (6-4-40) + 1% oil emulsion, immediately before the new growth commences. This will help to clean up the fungus present on old scabs.

(2) Bordeaux of 4-4-40 strength, or Bordeaux (4-4-40) + 1% oil emulsion, at about the middle of the flowering period. This and the subsequent application are for the protection of young foliage and fruit.

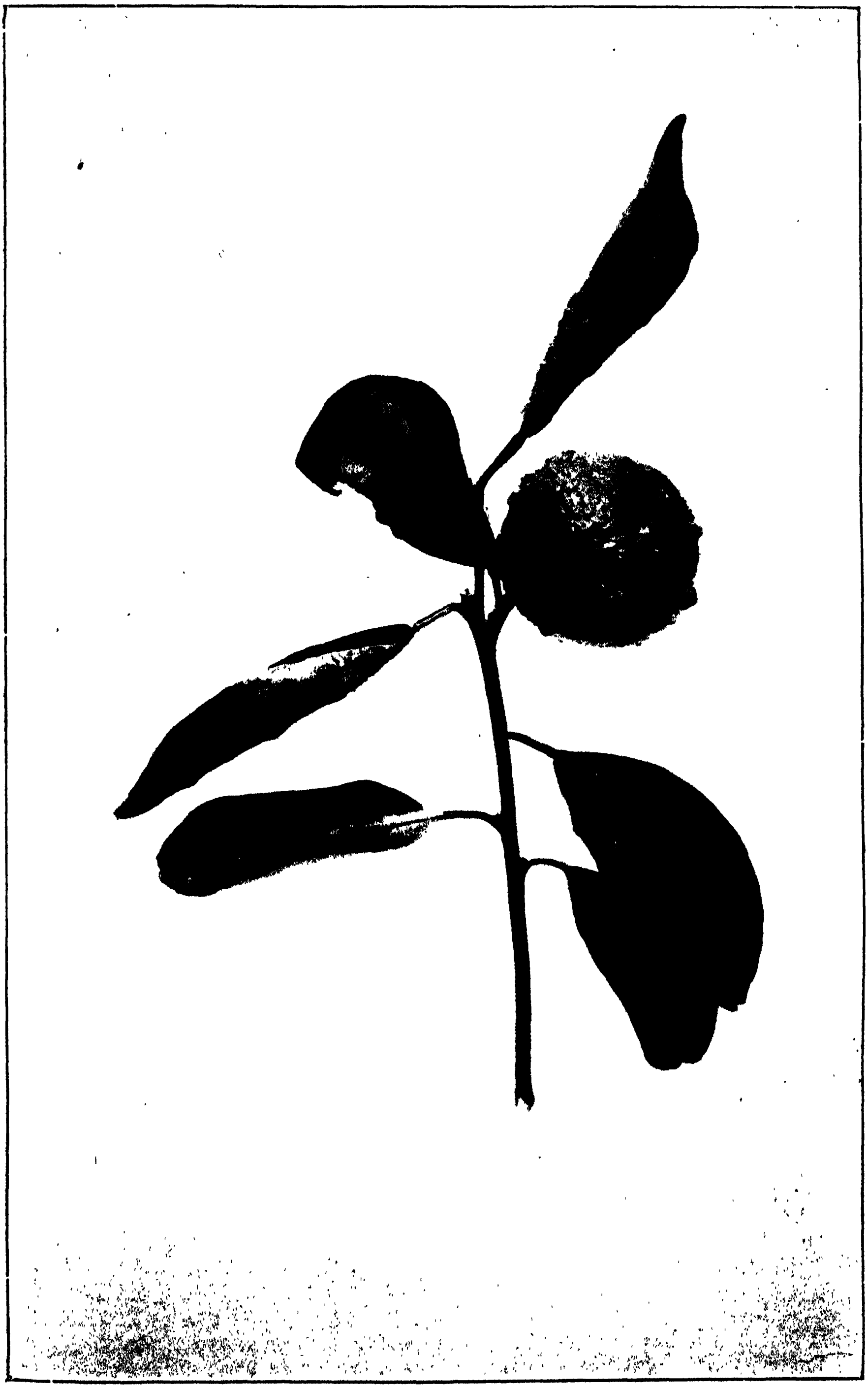

Plate 52.—Mandarin affected with Scab.

(3) Bordeaux again as soon as the fruit have set.

(4) If the season is exceptionally wet it is advisable to give one or two further applications in order to keep the young fruit and foliage well covered.

It must be remembered that Bordeaux mixture may check the development of entomogenous fungi which materially aid in keeping down scale. It will therefore be necessary to pay particular attention to the control of these pests after Bordeaux has been used. If scab infestation is not serious or if the season is dry, lime sulphur, which does not possess these disadvantages to the same extent, may be substituted.

Blue Mould.

Blue mould rot of citrus fruits is caused by two allied fungi—*Penicillium digitatum* which forms an olive-green powdery spore coat over rotting fruit, and *Penicillium italicum* in which the spore mass is distinctly blue. The former is by far the chief source of rot in Queensland, and has been known to cause loss of 30 per cent. and over in long-distance consignments. This mould is sometimes referred to as the green mould to distinguish it from the blue form, but since remarks concerning the one are in general applicable to the other they will for convenience be treated together.

SYMPTOMS.

The rot commences as a small, soft, water-soaked spot on the rind. The area enlarges, and when it has reached about an inch in diameter a white mould develops on the surface and extends out in pace with the softening of the rind by the fungus within the tissue. From the white surface mould are produced closely aggregated short upright hyphæ, which branch two or three times near the end. From each of the final branchlets are cut off chains of minute oval spores. It is the colour of these spores in mass which gives the characteristic appearance of the rotted fruit to which the disease owes its name. Finally the fruit may become broken down to a soft watery mass.

CONTRIBUTING CAUSES.

The loss of citrus fruit in transport on account of blue mould rot has exercised the minds of orchardists throughout the world ever since the growing of these fruits began to assume a large commercial scale. The fungi causing the damage and the factors contributing to the development of the rot have been investigated in various countries, and these investigations in almost every case have led to three important conclusions which clearly point the way to the solution of the problem. These are—

(1) The species of *Penicillium* causing blue mould rot are relatively weak parasites and are unable as a general rule to penetrate the skin of a perfectly sound fruit. The blue mould fungus differs from the green in that the fungal threads making up the surface mould of the former may sometimes pass from a rotted to a healthy uninjured fruit with which it is in direct contact in the case. The first infection by means of spores must take place through wounds in the case of both species. It is a common sight to see perfectly sound fruit lying in a pack alongside one covered with green mould, clearly showing the immunity from infection of the uninjured fruit.

(2) The wounds occasioned during picking, carting, and packing serve as centres for infection by the blue mould spores which are present in the air of the orchard and packing house. Examination of twenty-one cases of oranges and mandarins arriving on the Brisbane markets showed that out of the 286 mouldy fruit present there were only 74 (or 25 per cent.) which did not show an obvious injury to account for the mould invasion, and very many of these consisted of fruit too mouldy for a primary cause to be ascertainable. The more common forms of injury were as follows:—Case bruises and cracks arising from poor packing, especially noticeable in connection with mandarins, 27 per cent.; punctures by long stalks, 18 per cent.; scratches and punctures of which the causal agency could not be determined with certainty, 16 per cent. The rest included miscellaneous injuries due to rubbing and pulling the button out, &c.

(3) The trouble can be to a great extent controlled by cleanliness and careful handling of the fruit to avoid bruising or otherwise injuring it.

CONTROL.

Keeping the above facts in view, the following recommendations can be made for the control of blue mould.

(1) All waste fruit in the orchard and packing house should be collected at frequent intervals and destroyed by burning or burying, as it will otherwise serve for the production of countless millions of mould spores to contaminate the air in which marketable fruit has to lie.

(2) Picking fruit during wet weather should be avoided, as fruit gathered under moist conditions usually shows a much higher incidence of blue mould. Great care should be exercised during picking operations in order to ensure that no injury is given by the clippers, finger nails, &c. The fruit should be cut, not pulled, and long stalks must be avoided as these are a frequent source of injury to other fruit. It may be found advisable in many cases to make a double cut, removing the stalk close back by a second cut when the fruit is held in the hand.

The method of handling during the transference to the packing shed and subsequently should be such as to avoid bruises or mechanical wounds. The collecting boxes should be smooth and the fruit must be placed in them carefully.

(4) Citrus fruit are best allowed to cure for three to seven days before packing, and all those in which rot commences should be removed by frequent inspection. The grader, if used, should be of a style which does not bruise the fruit. Close attention must be paid to the picking over, and all blemished fruit should be discarded. Packing cases should be made of smooth wood, and care must be taken that the fruit are not rubbed against the sides or the pack made too tight, as bruising and cracking often arise from these causes, especially in the case of mandarins.

Wrapping the fruit serves to lessen blue mould loss by reducing the number of case bruises, and by enclosing any mouldy fruit so that the spores are not distributed throughout the case.

(5) Careful carriage of the consignment between packing shed and market is also advisable but not always within the control of the grower.

By giving attention to cleanliness and careful handling the loss due to blue mould may be reduced to an insignificant minimum.

Exanthema.

This disease is one apparently not dependent on the presence of parasitic organisms for its development, but is rather due to physiological disorders brought about by improper nutrition. Most varieties of citrus are subject to the malady.

SYMPTOMS.

In the typical cases on young trees, symptoms commence with a flush of young succulent growth the branches of which are sometimes curved at the ends and usually bear abnormally large dark-green leaves. After a time the new growth assumes a slightly yellowish tinge, and there are developed along the branches dark-brown patches of a resinous appearance due to the deposition of a resin-like substance in the cells of the outer layers of bark. Definite longitudinal cracks may be formed from which is extruded the brown resin mass to form a rounded or fissured excrescence. (Plate 53.) Gum pockets having the appearance of a rounded blister may be formed on the succulent growth by the accumulation of the brown gummy secretion in certain spots between the wood and bark, the latter being forced out in the process. Multiple buds and very angular stems are often characters associated with branches exhibiting this disease. The leaves of the affected terminals usually drop, leaving the bare brown branches showing up conspicuously. Later these die back and are invaded by various saprophytic fungi. A dark-brown superficial marking somewhat similar to that occurring on the shoots may be present on the rind of the fruit borne by a diseased tree. These patches often have the appearance of being formed from aggregated spots. The latter are slightly raised and cracked, which makes the affected area rough to the touch. The presence of this fruit discolouration is usually accompanied by a hardening of the skin, with a consequent restriction in growth, which often leads to cracking.

CONTRIBUTING CONDITIONS.

Exanthema usually makes its appearance on very light sandy soils lacking in humus, such as are to be found in some of the coastal citrus areas. The use of this type of soil would appear to be one of the main causes of the occurrence of this disease so far as Queensland is concerned. Heavy rainfall followed by a dry spell; poor drainage; and the excessive use of organic nitrogenous manures are factors also stated to favour the development of exanthema.

CONTROL.

All dead and dying wood should be removed by thorough pruning.

The soil conditions should be improved as far as possible by judicious manuring (avoiding excessive use of organic nitrogen), and by the ploughing in of green crops to better the physical condition and increase the humus content. Artificial drainage should be practised when necessary.

Some growers have obtained benefit from spraying with Bordeaux mixture, the copper sulphate in this case appearing to act largely as a tonic. The bluestone may also be applied by spreading it on the ground round the tree. In this case ½ to 1 lb. per tree is used, depending on the size of the tree.

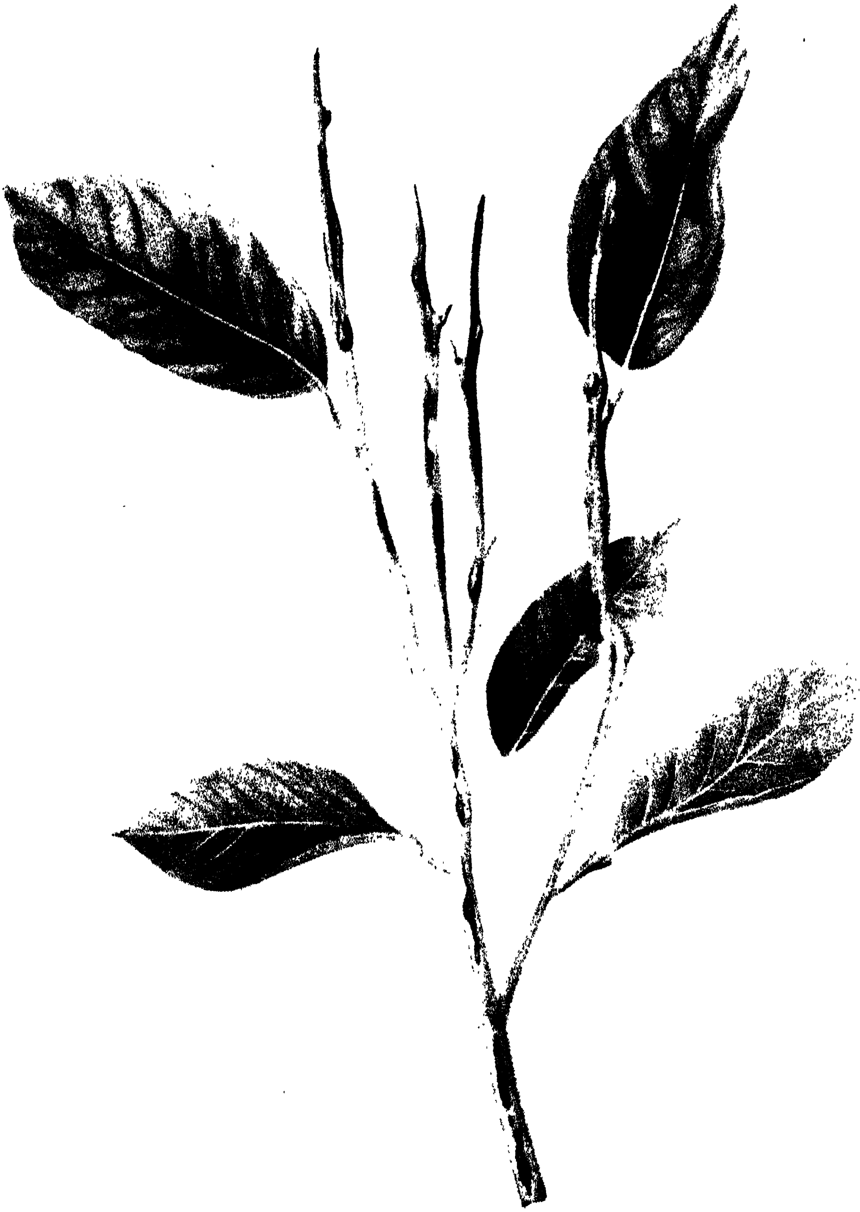

PLATE 53.—EXANTHEMA ON ORANGE.

From a water-colour drawing by I. W. Helmsing.

Dieback.

Dieback is a condition which may sometimes be confused with exanthema. It is characterised by the death of twigs and small branches on the outside and more especially on the top of the tree. This trouble differs from Exanthema in the absence of resinous exudation, gum pockets, and multiple buds, and in the fact that the affected branches are usually of stunted rather than of vigorous growth.

Pink pustules of a fungus (*Glæosporium sp.*) are usually scattered over the dying twigs. This fungus commonly attacks only those branches which are in a weak or dying condition owing to the tree having insufficient vigour to support them.

The trouble appears in neglected orchards and on poor land, more especially if a hard impervious subsoil is causing bad drainage.

The treatment should follow the lines of improving the growing conditions of the tree by good cultivation, manuring, and if necessary drainage, when the trouble will be found to disappear.

Collar Rot.

Collar rot or foot rot is the commonest and the most destructive of the several forms of gumming disease to which citrus trees are subject. Lemon trees or the lemon stock on which other varieties are worked are most susceptible. The mandarin and sweet orange are also sometimes affected.

SYMPTOMS.

The disease usually occurs at the base of the main trunk, where it appears as a darker, somewhat water-soaked area not very definitely marked off from the surrounding healthy bark. There is usually a puncture or slit towards the centre from which gum-drops have exuded. The bark over the diseased region may be easily lifted, and between this and the wood is found a slimy, clear, gum-like substance. The wood below the diseased bark exhibits a brown discolouration, which, however, does not usually penetrate for more than $\frac{1}{8}$ inch. The margin between this and the healthy tissue is especially distinct and shows as a narrow band of slightly darker brown.

A collar rot of any size will make its presence evident by a yellowing of the foliage and dieback. This will often take place only on the one or more branches which arise from the same side of the trunk as is affected by the rot. Eventually the branch may die out completely. Should the lesion extend round the trunk the whole tree may be ringbarked and die.

CAUSE.

The organism recorded as causing foot rot in Queensland is a fungus known as *Fusarium limonis*. It is, however, probable that other fungi are at times responsible for the trouble.

CONTROL.

The organisms concerned in collar rot will not penetrate healthy living bark, so that a wound of some form must be present before infection can take place. It is therefore important to avoid any injury during cultivation.

Badly drained soil and water accumulation round the crown are conducive to gumming and should therefore be avoided.

A close watch should be kept for the appearance of collar rot lesions. When caught before they have advanced too far the disease can be cured by surgical methods. The soil should be opened up away from the crown and main roots so as to expose these to the sun and air. The diseased bark and wood must then be carefully removed by cutting or scraping with a sharp instrument well back into sound tissue. The excised pieces should be carefully collected and burnt. If any of the roots are badly affected they are best removed entirely. When the trunk has been thoroughly cleaned of all diseased tissue the wound should be painted with Bordeaux paste.

Armillaria Root Rot.

The tree affected by this disease exhibits symptoms similar to those associated with collar rot. There is usually a yellowing of the foliage of the whole tree or on one or more branches, together with more or less dieback. As the fungus responsible for this rot attacks also a number of other fruit-trees, the full description of the disease, together with recommendations for treatment, have been left to Chapter XIII.

Fumagine or Sooty Mould.

Sooty mould cannot be considered as a definite disease to the same extent as may the citrus troubles previously described, but since it is of conspicuous appearance and to a certain extent detrimental to the tree affected a short description is here given.

SYMPTOMS.

The tree affected with fumagine is conspicuous on account of the black sooty deposit covering the foliage and often the fruit. It is common to see whole trees or even entire orchards exhibiting the dirty black appearance due to the presence of this mould. The fruit may be rendered so unsightly that scrubbing becomes necessary.

CAUSE.

An examination of the leaves will show the sooty appearance to be due to a thin, black, superficial film, which may be easily scraped off in flakes. This film is formed by the close interlacing of the dark mycelial filaments of a fungus known as *Capnodium citricolum*. This fungus is not a plant parasite, but lives on the sugary substances which become scattered over the leaves after secretion by certain scale insects. Of these latter the chief ones concerned are the pink and white wax scales and to a certain extent the Lecanium or soft scales.

The fungus is entirely superficial in its growth and therefore does not directly injure the tree. The presence of the covering of mould will, however, eventually tend to weaken the tree, as assimilation will be checked by the exclusion of light and by the blocking up of the breathing pores of the leaf.

CONTROL.

To get rid of sooty mould it is necessary to destroy the scale insects on whose secretion the fungus is dependent for its existence. This should be done by suitable spraying or cyaniding, when the fumagine will be found to gradually disappear. If it is desired to remove the mould quickly after the destruction of the scale, the trees may be sprayed with a thin paste made by boiling flour in water. This will form a skin over the leaf which when it dries will flake off and carry away the mould in the process.

NOTES ON SOME POT EXPERIMENTS CARRIED OUT ON THE ABNORMAL SOIL PATCHES—ATHERTON TABLELAND.

By W. R. WINKS, B.Sc., A.A.C.I.

IT has been recorded for some time that the maize grown on certain scrub soils of the Atherton Tableland, particularly around Kairi, exhibits a patchiness of growth, some being quite normal and producing average crops, while in other cases small areas appear which are stunted and fail to produce any cob at all.

The writer's visit to the Tableland was during the planting season, and already this abnormality could be seen in the maize plants 9 inches to 1 foot high, the abnormal plants being yellow and red in colour and much smaller than other plants of the same age.

There appeared to be no regular distribution of these patches, which, over a given area, may amount to 25 per cent. of the total area.

Information obtained from farmers shows that these patches increase every year, not by the appearance of new patches, but by the ones already in existence growing on themselves.

It was, however, not possible for the writer to confirm this method of increase himself, due to the short time at his disposal, but the existence of the abnormality was, at the time of his visit, sufficiently serious to warrant further investigation with a view to its eradication.

The appearance of these patches in the field affords few clues as to why they appear. A white ashy material generally present on these patches seems to point to a destruction of the organic material of the soil, due to burning off of the scrub timbers, but further investigation fails to confirm this view.

This ashy material is not assimilated by the soil even after years of ploughing, but it is probable that the toxic material existing in it may be accumulated just above the hardpan, which is present at a depth of from 5 to 6 inches below both the good and bad soils.

On other parts of the Tableland large areas of newly burnt land growing quite normal maize could be observed, much of the maize growing in beds of ashes and appearing to suffer no ill effects from the ashes. It is also generally stated that this abnormality does not appear on new land until at least the third planting.

As field investigation did not denote very much to account for the poor condition of the maize, a large amount of the abnormal soil was procured to a depth of 4 inches, from the farm of Mr. J. Hooper, of Kairi, and some normal soil from within a few feet of this abnormal soil was also procured for pot experiments.

Analyses of the two soils (supplied herewith) showed little variation, except in the case of lime, the bad soil containing nearly three times as much lime as the good soil, much of this being in the form of carbonate, while the good soil contained no carbonate.

It would appear, therefore, that the abnormality was due, in some part, to excessive lime, and pot experiments were arranged to seek a remedy. Maize is a comparatively cheap crop, and any treatment recommended must, of necessity, be one that is comparatively cheap.

The Pot Trials.

For the experiment, pots 5 inches in depth and containing 2 lb. of soil were used. The condition of the optimum moisture was determined by the addition of varying amounts of water to the soil, till it came to a state which appeared to be the best moisture condition for plant growth—in this case 25 per cent.—and the soils were kept in this condition during the greater part of their growth, being weighed every day, and the amount of water used by the plant and lost by evaporation added.

Two seeds were planted in each pot, the pots being numbered, and the treatment for each pot being drawn from a hat. After planting the pots were mixed up haphazardly so that the personal factor did not enter into the observations.

In the early part of the experiment mice destroyed many of the seeds, but after a cover had been made by Mr. Cree this trouble was overcome, but it was found necessary to cover the plants at night so that outside moisture could not get into the pots, and this prevented them getting much of the early morning sun, and in the week-ends they were covered for more than a day and a-half.

The amount of fertiliser added was worked out on a drill basis, that is on the basis that the fertiliser would be planted in a drill 6 inches wide, each drill 3 ft. 6 inches apart, and that it would operate to a depth of 4 inches. On this basis one-eighth part of the field would be covered with fertiliser.

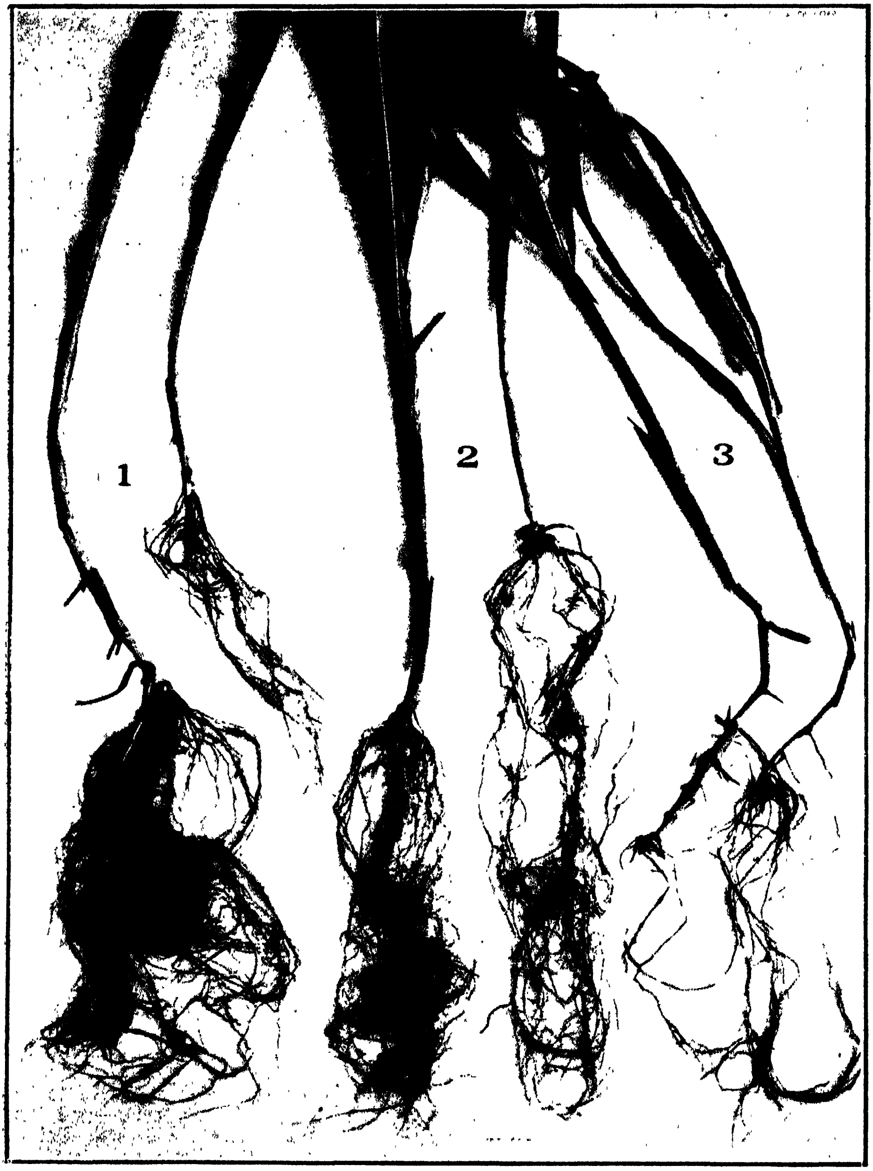

Plate 54.

No. 1.—Bad soil fertilised with a complete fertiliser, consisting of 1 cwt. nitrate of soda, 1 cwt. sulphate of potash, 180 lb. superphosphate, and 5 cwt. of gypsum per acre. The second plant in this series was checked by ammonia fumes.

No. 2.—Normal soil unfertilised.

No. 3.—Bad soil unfertilised. Note the secondary roots sent out to support the plant due to its primary root system being insufficient for this purpose.

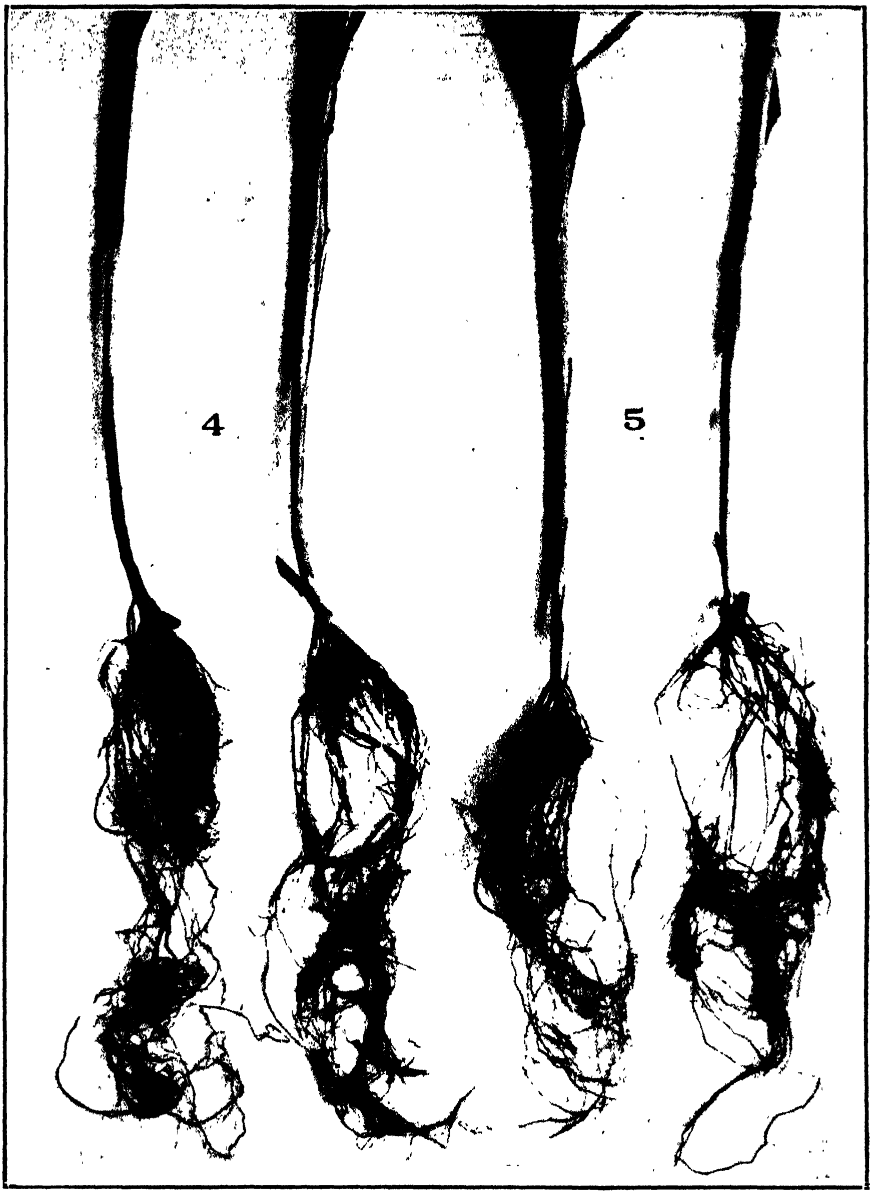

PLATE 55.

No. 4.—Bad soil fertilised with 1 cwt. sulphate of ammonia per acre.
No. 5.—Bad soil fertilised with 1 cwt. nitrate of soda per acre.

While there is much to be said against this reasoning as to the application of fertilisers, the amounts added on a broadcast basis to a 2-lb pot at the rate of 1 cwt. to the acre would be so small as to be almost impossible of mixing with the soil.

Even at this rate a soil of specific gravity 1.27, at the rate of 1 cwt. to the acre, gives on a drill basis only .702 grammes to a 2-lb. pot, or about one-fortieth of an ounce.

Four pots were allotted to each treatment, and four controls each of normal and abnormal soil unfertilised were used as a check on the experiment.

The treatments used were as follows:—

Sulphur	1 cwt. per acre.
Sulphate of potash	1 cwt. per acre.
Nitrate of soda	1 cwt. per acre.
Sulphate of ammonia	1 cwt. per acre.
Gypsum	5 cwt. per acre.
Gypsum	10 cwt. per acre.
Superphosphate	180 lb. per acre.
Superphosphate	3 cwt. per acre.
Complete fertiliser	1 cwt. nitrate of soda, 1 cwt. potash, 180 lb. superphosphate, 5 cwt. gypsum (on broadcast basis).

One pot each in the above experiments was watered with distilled water, but during the progress of the experiments these pots (which were kept together for the convenience of watering) had ammonia fumes blown over them, burning their leaves and checking their growth to a great extent. Two of the pots containing complete fertiliser were also subjected to a similar calamity.

In the experiments a mistake was made in adding the gypsum on a drill basis, as it was originally intended to be used on a broadcast basis, but this was a rather fortunate error as will be demonstrated later. In the complete fertiliser the gypsum was added on a broadcast basis.

The experiments were commenced on 7th January, 1929, and on 12th January the plants were sufficiently advanced to allow of one being removed from each pot, leaving one plant to the pot in each case. The plants were dug up and their roots examined on 22nd March, 1929, and photographed, 23rd March, 1929.

Results.

The results of this experiment served to show quite definitely that the abnormal soils were unfit for maize growth. In every case the plants were thin and spindly with very little root system, which in most cases had been too weak to support them, and hence they were blown over and had sent out secondary stem roots. This is well exemplified in fig. 3 in Plate (54).

The maize in the normal soil was strong and healthy and had good root growth, and, in fact, was little different from the best of the treated pots (Plate (54), fig. 2).

The best growth of all was made by one plant of the completely fertilised pot, but this result is not conclusive as the other three plants were spoilt by ammonia fumes (Plate (54), fig. 1).

The pots treated with 5 cwt. of gypsum and 1 cwt. of sulphur showed little or no response to this treatment, being only slightly above the average of the bad soil controls unfertilised, as will be shown in Plate (56). Little response was shown to potash, which is to be expected from the fact that analysis shows the soils to contain an abundance of available potash (Plate (57)).

A treatment with 10 cwt. of gypsum gave a decided response, but as this was on a drill basis and not a broadcast basis, such treatment would be too expensive to adopt on a cheap crop (Plate (56)).

As the soil is deficient in available phosphoric acid, this wats used in the form of superphosphate, at the rate of 180 lb. per acre and 3 cwt. per acre, the lesser amount showing better results than the greater, which is in accordance with experimental results on the Tableland (Plate (57)).

Very noticeable results were shown by the ammonium sulphate and nitrate of soda treatments. In both cases the maize grew larger and better than in any of the check pots, the better growth being given by ammonium sulphate (Plate (55)).

This would almost be expected as sulphate of ammonia is an acid fertiliser and would tend to bring the soil to a slightly acid or neutral condition, thus overcoming the excess alkalinity.

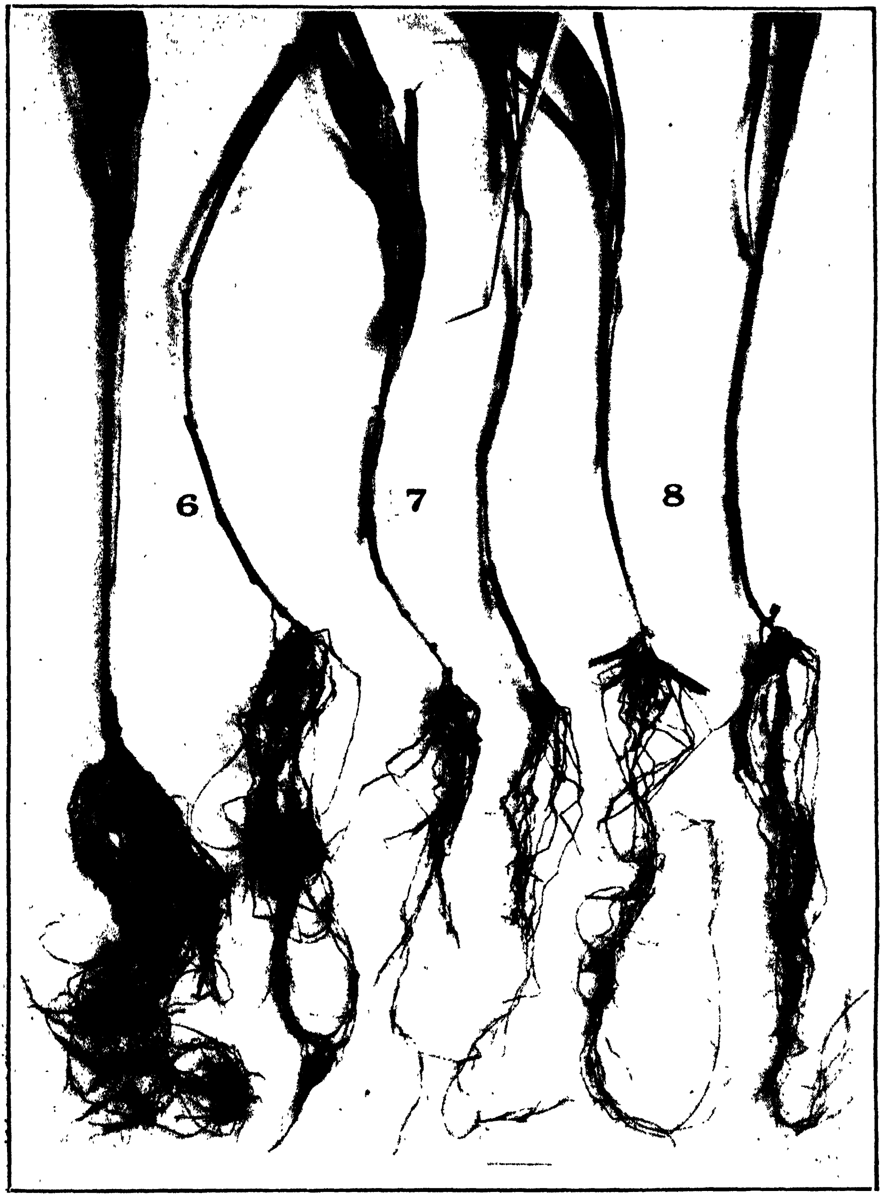

Plate 56.

No. 6.—Bad soil fertilised with 10 cwt. of gypsum per acre, in drills.
No. 7.—Bad soil fertilised with 5 cwt. of gypsum per acre, in drills.
No. 8.—Bad soil fertilised with 1 cwt. per acre of sulphur.

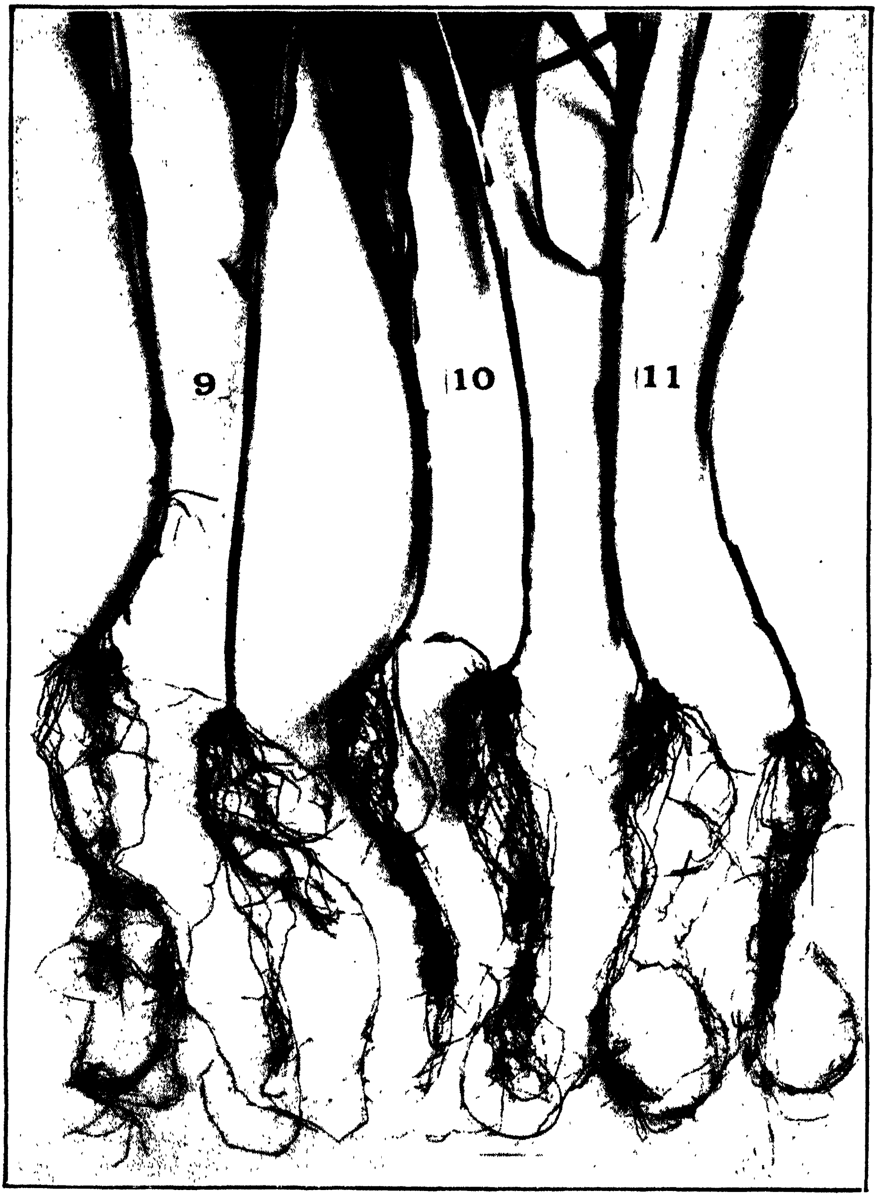

Plate 57.

No. 9.—Bad soil fertilised with 3 cwt. superphosphate per acre.
No 10.—Bad soil fertilised with 180 lb. superphosphate per acre.
No. 11.—Bad soil fertilised with 1 cwt. sulphate of potash per acre.

Summary.

The experiments, while not being conclusive in showing the best fertiliser for use in the district, show that decidedly abnormal conditions exist in the Atherton scrub soils.

These conditions can probably be overcome and the soil brought back to normal by treatment with fertilisers, the best and most suitable of which appears from these experiments, to be sulphate of ammonia.

The good soils were not subjected to any fertiliser treatment, but treatment of the bad soils did not improve them beyond the normal soils, but merely brought them to the normal condition.

A suggested field treatment would be for a field officer to carefully map out certain of these bad patches and to treat them with (1) nitrate of soda, 1 cwt. per acre; (2) ammonium sulphate, 1 cwt. per acre; (3) superphosphate, 180 lb. per acre; and a complete fertiliser consisting of (4) ammonium sulphate, 1 cwt. per acre; superphosphate, 180 lb. per acre; sulphate of potash, 1 cwt. per acre; allowing, say, four drills for each treatment.

This could be carried out with comparatively little expense, and would serve as a check on the laboratory experimental work, though, in the opinion of the writer, much could be done by putting the land under grass or lucerne for two or three years and allowing it to rest from the continuous cropping without rotation to which it has been subjected in past years.

Subsoiling of these patches would also be advisable, but it should be carried out in such a way that the subsoil is broken but not brought to the surface.

ANALYSIS OF ATHERTON SOILS USED IN POT EXPERIMENTS.

—	Ashy Material.		Bad Soil.		Good Soil.	
Laboratory No.	..		3021		3022	
Classification	Br. Loam		Choc. Loam		Choc. Loam	
Reaction (Truog Acidity)	Nil.		Nil.		Very slight	
Apparent Spc. Grav.	1·23		1·27		1·20	
Weight of soil in tons per acre 12 in. deep	1493		1542		1457	
Water Capacity	54%		50%		58%	
Weight absorbed tons per acre	806		771		845	
Capillarity after 3, 6, 24, and 48 hours	7, 10, 16, 21		14¾, 18¼, 23¾, 25¼		10¼, 13¼, 17¾, 21	
Moisture	3·36 lb. per ac.		8·70 lb. per ac.		5·30 lb. per ac.	
Humus	1·81 4 in. deep		1·86 4 in. deep		1·95 4 in. deep	
Other organic material and combined moisture	15·53		12·88		13·19	
Chlorine	·004		·007		·010	
Nitrogen	·238	2565	·227	2383	·254	2621
Soluble in Hydrochloric acid of specific gravity –						
Phosphoric acid P_2O_5	·38	4126	·41	4260	·38	3916
Iron, alumina, &c. Fe_2O_3, Al_2O_3.	35·02		39·52		39·92	
Lime CaO	6·71	72233	2·08	21870	88	9028
Magnesia MgO	·86		1·16		·49	
Potash K_2O	·09	1003	·11	1151	·13	1305
Insoluble Residue	39·37		41·68		43·26	
Soluble in 1 per cent. Citric Acid Solution—						
Phosphoric acid P_2O_5	·0003	3	·0008	8	·0008	8
Lime CaO	·7933	8560	·8865	9315	·3690	3798
Magnesia MgO	·0999		·2519		·2356	
Potash K_2O	·0205	221	·0141	148	·0284	293
	A		B		C	

A—Agricultural analysis of ashy material mixed with soil.
B—Agricultural analysis of abnormal soil.
C—Agricultural analysis of normal soil.

ANALYSIS OF ASHY MATERIAL IN SOIL.

Lab. 2280.

	Per cent.
Moisture	2.56
Loss on ignition	16.32
Silica	34.03
Potash	.26
Lime	14.14
Magnesia	1.60
Phosphoric acid	.47
Iron and alumina	31.40

ANALYSIS OF ASH OF MAIZE PLANTS.

Moisture.	On air-dried material.	Calculated to dry weight.
	Per cent.	Per cent.
Ash	10.80	11.30
Phosphoric acid	5.16	5.32
Iron	4.60	4.81
Alumina	9.44	9.90
Lime	5.32	5.57

INDEX TO PLATES.

PLATE (54).

Fig. 1.—Bad soil fertilised with a complete fertiliser consisting of 1 cwt. nitrate of soda, 1 cwt. sulphate of potash, 180 lb. superphosphate, and 5 cwt. of gypsum per acre. The gypsum was added on a broadcast basis calculated as 5 cwt. per acre, 4 inches deep. The second plant in this series was checked by ammonia fumes.

Fig. 2.—Normal soil unfertilised.

Fig. 3.—Abnormal soil unfertilised. Note the secondary roots sent out from the cornstalk to support the plant, due to its primary root system being insufficient for this purpose.

PLATE (55).

Fig. 4.—Bad soil fertilised with 1 cwt. sulphate of ammonia per acre.

Fig. 5.—Bad soil fertilised with 1 cwt. nitrate of soda per acre.

PLATE (56).

Fig. 6.—Bad soil fertilised with 10 cwt. of gypsum per acre in drills.

Fig. 7.—Bad soil fertilised with 5 cwt. of gypsum per acre in drills.

Fig. 8.—Bad soil fertilised with 1 cwt. of sulphur per acre.

PLATE (57).

Fig. 9.—Bad soil fertilised with 3 cwt. superphosphate per acre.

Fig. 10.—Bad soil fertilised with 180 lb. superphosphate per acre.

Fig. 11.—Bad soil fertilised with 1 cwt. sulphate of potash per acre.

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AGRICULTURE IN QUEENSLAND.

QUARTERLY CROP REPORT.

The Minister for Agriculture, Hon. Harry F. Walker, has received the following reports from Messrs. A. E. Gibson, G. B. Brooks, and N. A. R. Pollock, Senior Instructors in Agriculture for the Southern, Central, and Northern Districts respectively.

SOUTHERN QUEENSLAND.

Although the rainfall experienced during the month of April was ample for agricultural and dairying requirements, the subsequent dry stretch extending from the beginning of May until well on towards the end of June had a counteracting effect and delayed wheat-planting, and also affected the dairying industry. Pastures have in all cases been reported upon as being ample for requirements, the dry, cold weather, accompanied in most instances by frost, has been responsible for a rapid drying off of all grass and herbage. Water supplies are in all instances adequate and sufficient for immediate requirements. Live stock in every instance are in good condition and markets are generally firm.

Although a considerable area of wheat had been sown with late maturing varieties early in April, as previously mentioned the lack of sufficient moisture delayed sowing, but with the advent of good rains in the latter part of June a considerable area has since been planted and sowing is now practically completed. A few areas which missed a sufficiency of rainfall will probably now lie fallow until the maize-planting season. It is expected that the area under wheat this year will approximately equal that of 1928.

Maize harvesting is approaching completion, and, whilst on the whole the crop may be regarded as satisfactory, certain areas report a medium harvest only. The area under crop is comparable with that of 1928.

Although the recent dry and cold weather experienced throughout the Downs has affected the growth of lucerne, good cuttings were being obtained before the frost. No general increase in the area under this crop is reported, although certain districts claim a slight improvement.

Fodder crops, including oats, barley, and in some instances late sorghums, are generally reported as good and show an increase in some districts in the acreages under oats for green fodder, particularly so in the coastal areas. Malting barley, owing to existing conditions, is below the average area sown on the Downs.

Pumpkins have given satisfactory yields in many districts, while in others crops have been light. Potatoes both English and sweet are expected to give satisfactory yields, and in some districts the area under these crops has increased. Harvesting of the crop is already completed in some districts, heavy yields being obtained. Root crops apart from potatoes, while giving in many instances satisfactory returns, do not appear to be favoured outside the immediate coastal areas, and even in these a decrease in area is reported.

Arrowroot crops are reported to be satisfactory, but a decline in the area under this crop is noted.

Heavy rain in the early part of the quarter under review was the cause of a fair amount of damage to lucerne crops harvested for hay, particularly so in the coastal areas; later cuttings have, however, been satisfactory.

Inland and above the Range the quality of the hay conserved has generally been high. On the black soil areas cultivation has, to a certain extent, been delayed by lack of soil moisture. On the lighter classes of soil field operations for summer crops are well advanced.

CENTRAL QUEENSLAND.

The rainfall received in the Central area during April ranged from 8.98 in. at Rockhampton to 2.86 in. at Jambin in the Callide Valley. May was remarkable for its dryness, no rainfall being registered during that month. The falls recorded in June compensated for the previous month's dryness, ranging from 10.39 at Rockhampton to 2.21 at Jambin.

Light frosts were experienced along the coast including Mackay, and heavy frosts recorded in the Dawson and Callide areas. Low temperatures were experienced earlier than usual, four frosts being recorded in the Callide during April. May was responsible for eight frosts, and nine were recorded in June. Early frosts were responsible for some damage to cotton and other crops.

Grass and water are plentiful in the various localities embracing Mackay and Bundaberg on the coast, and Durango, Dawson and Callide Valleys, and Theodore to the west.

Although a few isolated cases of pleuro and blackleg have been reported, stock generally are healthy and in good condition. All classes of stock have been realising satisfactory prices and a keen demand exists for stores. Draught horses are fetching remarkably good prices in the Mackay district.

The area under wheat is estimated to be double that of last season. Incidentally, increased area of peanuts, sorghums, pumpkins, lucerne, and rape have been noted, whilst more attention is being given to the growing of winter cereals for dairy fodder purposes. The area harvested for potatoes, both English and sweet, shows a decrease compared with last season, for which floods in the early part of the year were mainly responsible.

Hay crops are mostly confined to panicums, millets, and sudan grass; these were generally secured in good condition. Many farmers in the Central district rely on stand-over crops of sorghum to carry their stock through the winter months.

It is estimated that approximately 800 tons of silage have been conserved during the last three months.

An excellent germination was secured from the first planting of wheat, and the recent rains will ensure later sowings germinating satisfactorily. Land upon which cotton and maize were grown is in the course of preparation for spring crops. Conditions generally are excellent for the preparation of good seed-beds.

Reviewing climatic conditions of the period under review, it may be considered that although on the whole they could be classed as good, they were at the same time erratic. Heavy falls of rain occurred during April and June, whilst over the whole area no rain fell in May. June registrations constituted a record for Rockhampton and surrounding districts. While there is an abundance of grass, no succulence is present in the dairy pastures, but recent rains are having the effect of promoting growths of herbage, and, owing to the fact that many farmers have sown areas of wheat, barley, or oats for winter feed, these are making excellent growth. The outlook for the ensuing three months is most promising.

NORTHERN QUEENSLAND.

Although the rainfall experienced during April in the northern portion of the State was above the average, May was almost rainless, while the precipitations recorded in June were also above the average. Pastures were stated to be excellent, though in lightly stocked localities much of the grass produced a rank growth.

Stock generally are in good condition, although it is admitted that most of the fats arriving at the meatworks could show an improvement in condition. The small flocks of sheep at Hervey's Range and on the Tableland are particularly mentioned as being in very good order.

Due to drought losses in previous seasons supplies of fat cattle are not heavy. Meatworks killings will probably be in the vicinity of 80,000 head, and it is anticipated that the average dressed weights of these will range between 650 to 700 lb. Present price, delivered at the works, is 25s. per 100 lb. for first quality, whilst retail butchers are paying a little more. A strong demand exists for store cattle, but very few are changing hands. The outlook for the cattle market generally is very bright.

The supply of pigs to the Tableland's bacon factory at Mareeba is steadily increasing.

While it is expected that the area under maize and peanuts is likely to decrease, increased areas are to be noted in broom millet, arrowroot, potatoes, tobacco, and all classes of fodder crops. The maize crop is now being harvested and is nearing completion, only a medium crop being anticipated. Late reports of harvesting operations on the Atherton Tableland point to a possible shortage of 7,000 tons compared with last season's figures.

Tableland hay has been harvested under adverse conditions and quality in consequence suffered, and can only be classed as useful for home consumption. In other localities, where conditions were more favourable, the quality is reported as very fair. No stack silage has been conserved, but the quantity conserved in pits and silos equals that of last season.

No appreciable area of land is as yet being prepared for cropping, except where crops are to be grown by the aid of irrigation. Ploughing usually commences in the months of September and October, when all the crops have been harvested. Generally speaking, the season has been favourable and prices realised for agricultural produce satisfactory.

The fine falls of rain experienced during June are expected to ensure satisfactory yields from truck crops as well as green fodders for dairy cattle. The area under the latter shows a gratifying increase, it being estimated that fully 600 acres on the Tableland are under barley, oats, and wheat for this purpose.

Cream supplies to the factories at Malanda, Ravenshoe, and Julatten are very satisfactory, and that dairying prospects for the next months are excellent, due to the fine rainfall that the Tableland has experienced, which is responsible for heavy growth of winter fodders that later on will mean increased supplies of cream to the factories.

Plate 58.—A Prolific Papaw Tree.

Grown by Mr. T. M. Evans within a coo-ee of the Brisbane Town Hall. There are over 200 fruits on this two-year old tree and still more are forming.

QUEENSLAND RAIN-FOREST TREES.

By W. D. FRANCIS, Assistant Government Botanist.

The Scrub Bloodwood (*Baloghia lucida*) is one of the smaller rain-forest trees, as it does not exceed about 1 ft. in stem diameter and about 90 ft. in height. The bark is very frequently marked by dark patches or spots of hardened gum. When cut the bark exudes a bright red sap which accounts for the common name of Scrub Bloodwood. The species extends from Illawarra, New South Wales (Bentham) to Rockingham Bay, North Queensland. It is found also on Lord Howe and Norfolk Islands and in New Caledonia.

Photo.: W. D. Francis.

PLATE 59.

SCRUB BLOODWOOD (*Baloghia lucida*), A TREE IN THE IMBIL RAIN FOREST.

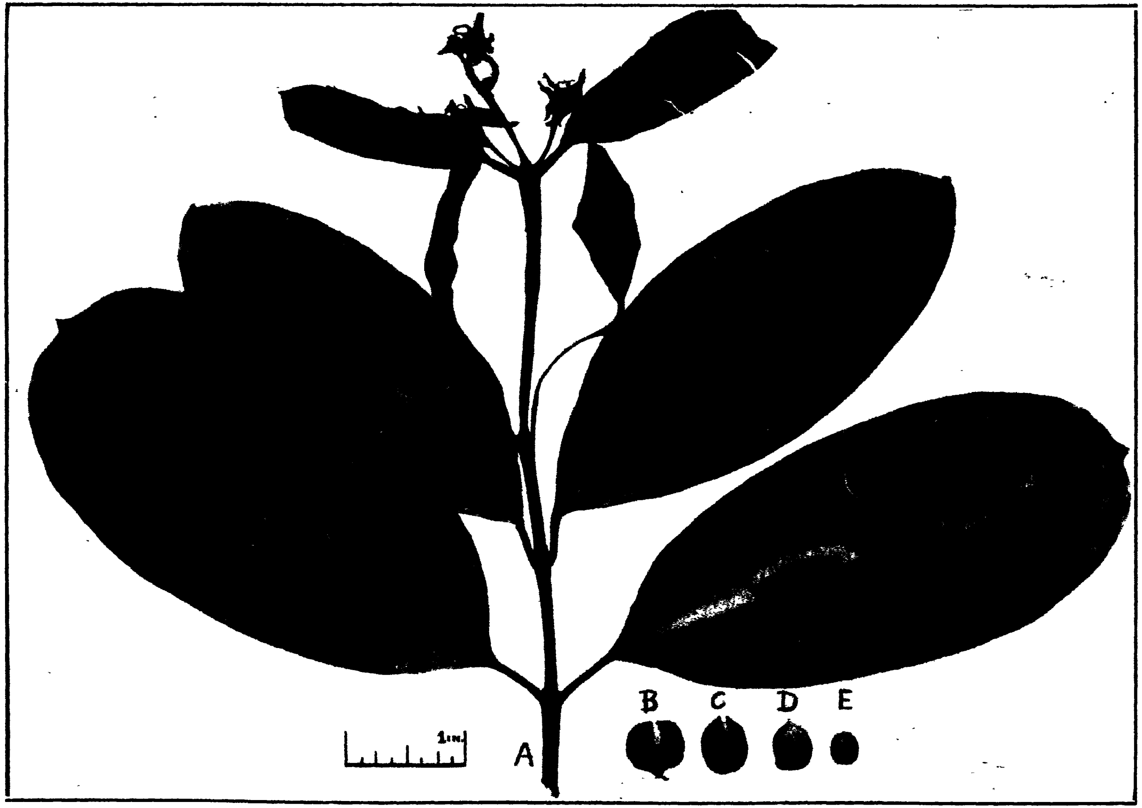

Photo.: Dept. of Agriculture and Stock.]

PLATE 60.—SCRUB BLOODWOOD (*Baloghia lucida*).

A. Flower-bearing twig; B. Dry fruit; C. Part of dry fruit; D. Same as C, but with outer covering removed; E. Seed.

RETIREMENT OF MR. HENRY TRYON.

VALEDICTORY GATHERING.

The retirement of Mr. Henry Tryon, formerly Government Entomologist and Vegetable Pathologist, from the Public Service of Queensland on 29th June was marked by a large valedictory gathering at the Department of Agriculture and Stock on the following Monday afternoon.

Mr. E. Graham (Under Secretary), who presided, said that the function had been arranged for the purpose of bidding an official farewell to Mr. Tryon, who had been associated with the Public Service of the State for nearly half a century. For the greater part of that time he had held a very important post in the Department as Government Entomologist. As a result of his work Queensland had greatly benefited, particularly in respect to the great primary industries of the State. In the course of his forty-six years of service he had been of great assistance to the Department of Agriculture and Stock, helping it, advising it, and controlling its entomological and pathological activities. His work had been extensive, and he had been responsible for much of the important pioneering work of Australia in his chosen scientific field. His services to the sugar industry particularly had been of immense value. As a result of a visit paid by him to New Guinea on a Government mission in 1896, new varieties of cane had been introduced into Queensland, including the variety known as Badila, which had proved of vast economic advantage to Queensland sugar-growers. Mr. Tryon's record was a splendid one of service to the State, and it was the hope and wish of his fellow officers of the Department, who had such a high appreciation of his work and worth, that he would enjoy a well-earned leisure; and they would all retain pleasant recollections of their association with him and of the yeoman service he had rendered to Queensland.

Mr. F. F. Coleman and Mr. C. T. White (Government Botanist) supported Mr. Graham's remarks.

Mr. Graham then presented Mr. Tryon with a wallet of bank notes as a token of the high esteem in which he was held by the officers of the Department. He remarked that Mr. Tryon had served under every Minister for Agriculture since that portfolio had been inaugurated.

Mr. White, on behalf of Mr. Hubert Jarvis, then presented Mr. Tryon with an additional serviceable token from the officers of the Department in the Stanthorpe area.

Mr. Tryon, in responding, thanked his former colleagues most heartily for meeting together to wish him god-speed on the occasion of his retirement. He appreciated also the material tokens which he was asked to accept as denotive of their appreciation of associations now severed. Gratitude evaporated, it had been said, on being expressed, and so he would not draw further upon even the ample fountain of it he possessed. However, he continued, a man was known by his friends. What of all that was good must be reflected upon him from them with all the friendliness of those whose personal characters whose mental gifts and whose efficiency went to constitute a departmental staff not excelled by any official administrative staffs in the Australian Commonwealth. Mr. Graham had reminded them that he had served under every Minister of the Department of Agriculture and under every Under Secretary. He had not troubled Ministers, but he was afraid that he could not plead that he had not troubled the permanent heads, however. He remembered one—always most kind to him—the first he was under and most worthy—saying: "Tryon, you have too much devil in you." He spoke with the strong conviction and terseness of a Scotsman, and being a religious man perhaps knew more of the devil than he did. (Laughter.)

The Ideals of Public Service.

They would expect him as a very old public servant to give them some of his views as to the ideals that should actuate the discharge of one's duties to his Department To every officer he would say—Study as fully as was possible to work in combination, manifesting combined effort. That was especially needful where science and scientific enterprise were involved. Recently it was his pleasure to hear the Public Service Commissioner, Mr. J. D. Story, urge this consideration in addressing members of the University staff as a matter of supreme importance. Again he would present to them another ideal—perhaps it should have been given priority—aim at some other end than emolument of office and the briefest extent of daily or weekly service; aim to make yourself, he concluded, ever more mentally strengthened, equipped, and efficient for the discharge of your duties—that is what you owe to the public whose servants you are. (Applause.)

Plate 61.—Mr. Henry Tryon.

Formerly Chief Government Entomologist and Vegetable Pathologist, who has retired after nearly half a century of service.

MR. TRYON'S SCIENTIFIC SERVICES.

Perhaps Mr. Tryon's most material service to Australia was one not directly associated with entomology. In 1895, when the Department, in co-operation with that of New South Wales, decided upon sending a party to New Guinea to secure new varieties of sugar-cane, it entrusted the command of the expedition to Mr. Tryon.

Accordingly, on the 14th September of that year, he left Thursday Island in the 18-ton cutter "P.C.E." for New Guinea, and after exploratory travels in many districts returned to Cooktown in January in the following year with his boat laden with sugar-canes that, together with a previous consignment from him, comprised sixty-five named varieties that he had obtained from many native gardens. Amongst these were the Goru (3) and Badila; and it would be difficult to estimate the immense monetary value they have been to Queensland. Then followed their methodical testing in the field, laboratory and mill, conducted by the Department of Agriculture and Stock and the Colonial Sugar Refining Company.

The mere enumeration of his Reports, often lengthy and detailed, will, it is considered, point to other benefits to the State accuring from his labours and his long years of service.

A Record of a Busy Life.

Following is a list of Mr. Tryon's scientific writings as contained in the "International Catalogue of Scientific Literature" (Queensland Vol.—J. Shirley B.Sc., 1899), with additions to date:—

ECONOMIC ZOOLOGY, INCLUDING ENTOMOLOGY.

1. Notes on Queensland Ants. Proc. Roy. Soc. Queens., 2, 1885, 146-162. Reprint. 34.
2. The Occurrence of the Genus Apus in Australia. Trans. Nat. Hist. Soc. Queensland, 1, 1893, 64-65.
3. The Bean Maggot. Trans. Nat. Hist. Soc. Queens., 1, 1892, 4-7.
4. Bean and Pea Weevils. Trans. Nat. Hist. Soc. Queensland, 1, 1894, 86-90.
5. List of Butterflies collected in British New Guinea Expeditions undertaken during year 1889-1890. Ann. Rep. Brit. N. Guinea, 1889-1890, 112-115.
6. Scale Insects—Coccidæ. Queens. Agr. Jour., 1, 1897, 118-129. Three plates.
7. List of Coleoptera collected in the St. Joseph River district of B. New Guinea, by Mr. A. C. English. Ann. Rep. Brit. N. Guinea, 1889-1890, 109-112.
8. Cryptolaemus Montrouzieri, or the Scale Insects' Enemy. Trans. Nat. Hist. Soc. Queens., 1, 1892, 23-26.
9. Hemiptera of New Guinea. Annals of the Queens. Mus., Part 2, 13-24. 1892.
10. Hemiptera collected in British New Guinea during 1890-91, under the auspices of His Honour the Administrator. Ann. Rep. on Brit. N. Guinea, 1890-91, 99-104.
11. Destructive Insects Liable of Introduction to Queensland. Queens. Agr. Jour., 1, 1897, 30-40.
12. The Insect Enemies of Cereals belonging to the genus Cecidomyia. Trans. Nat. Hist. Soc. Queens., 1, 1894, 81-83.
13. Insect Friends and Insect Foes (Fruitgrowers' Conf. Brisb. June 1897). Queens. Agr. Jour., 1, 1897, 465-472.
14. Insects as Fungus Hosts. Trans. Nat. Hist. Soc. Queens., 1, 1893, 51-59.
15. Report on Insect (and Fungus) Pest. Parliamentary paper, Brisbane, 1889: 8vo. edition Dep. Agr. Bris. 1889. (Edition 3 Annual Report of Department of Agriculture 1889-1890, Brisbane: Government Printer.) Reviews (1) U.S.A. (2) Canada, &c.
16. Three Undescribed Insects whose food plant is the Moreton Bay Fig, and the Injuries which they Occasion. Trans. Nat. Hist. Soc. Queens., 1, 1893, 60-63.
17. Injurious Marine Animal. Trans. Nat. Hist. Soc. Queens., 1, 1893, 39-45.
18. Judicial Entomology, and an Unrecorded Habit of White Ants. Proc. Roy. Soc. Queens., 4, 1887, 119-123.
19. Errata contained in "A List of the Land Shells recorded from Queensland." Proc. Roy. Soc. Queensland, 5, 1888, 131-137.

20. Orange-piercing Moths—Fam. Ophiderinæ. Queens. Ag. Jour. 2, 1898, 308-315. Plates XVIII.-XXII.

21. The Parasite of the Fruit Maggot. Trans. Nat. Hist. Soc. Queens., 1, 1892, 8-9.

22. On Peripatus and its Occurrence in Australia. Proc. Roy Soc. Queens., 4, 1887, 78-85.

23. Pernicious or San José Scale. Queens. Ag. Jour., 2, June, 1898, 494-510. Plates XL. and XLI.

24. Bulletin No. 4, Second Series. The Disease affecting the Orange Orchards of Wide Bay, and the Insect Pests prevalent therein. Department of Agriculture, October 1894.

25. A New Tobacco Pest (*Lita solanella*). Trans. Nat. Hist. Soc. Queens., 1, 1892, 19-22.

26. The Whistling Moth. Trans. Nat. Hist. Soc. Queens., 1, 1892, 1-3.

27. "Insects" of British New Guinea. By J. P. Thomson, F.R.S.G., &c. Appendix III. *Op. cit.* 222-272. Lond., 1892.

28. Insect Friends and Insect Foes. Report of Proc. of Conference of Australian Fruitgrowers, June 1897, pp. 108-115. Brisbane 1897.

29. "The Diseases affecting the Orange Orchards of the Wide Bay and the Insect Pests present thereon." Bulletin, 4th October, 1894. Department of Agriculture. Brisbane, 1894.

30. The Tobacco Beetle. "Agricultural Gazette" New South Wales, Vol. 1, Pt. 3, pp. 273-277, Dec., 1900.

31. Experiments in "Cyaniding Oranges," Dep. of Agric. Agricultural Journal, Vol. IV., pp. 450-456.

32. Vaginula Slugs, Dep. of Agr. Agr. Journal, Vol. V., pp. 63-70.

33. Caterpillar Plaugue (*Leucania unipuncta* Hawe), Dep. of Agr. Agr. Journal, Vol. VI., pp. 135-147. Feb., 1900. And as separate, Qd. Dep. Agr., 1921, pp. 1-17, Pl. 1-3.

34. Harvesting Ants, Dep. of Agr. Qd. Agr. Journal, Vol. VII., July, 1900, pp. 71 79.

35. The Sweet Potato Weevil (*Cylas turcipennis* Bohm), Dep. of Agr. Qd. Agr. Journal, VII., 176-189.

36. Carpenter Bees, *op. cit.*, 553-554.

37. Pineapple Mealy Bug (*Dactylopius bromelia* Bouche), *op. cit.*, 297-298.

38. A Parasite of Sugar Cane Beetle Grubs (*Dielis formosus* Guerin), Dep. of Ag. Qd. Agr. Journal, Vol. X. (February, 1902.)

39. Entomology (Miscellaneous Notes), Dep. of Agr. 90. Agr. Journal, Vol. X. p. 62-3 (1902).

40. Pineapple Mealy Bug. Agricultural Journal, Cape of Good Hope, Vol. XVIII., 549-550 (1901).

41. Grub Pest of Sugar Cane (*Lepidiota squamulata* (*Lepidoderma albohirtum*)) of the Mackay District. Dep. of Agr., July, 1895, pp. 1-56. Brisbane, 1895.

42. Queensland Butterflies (thirty-two articles under signature "Aurelia") "Queenslander."

43. "Insects." Baron Sir F. von Mueller, M.D., F.R.S., &c, Great Australian Botanist. (Obit.) Natural History Soc. Qd., Oct., 1896. "Brisbane Observer," 20th Oct., 1896.

44. Presidential Address for 1892. Nat. Hist. Soc. of Queensland. Proc. Nat. Hist. Sc. Qd., 1892.

45. ***Rhopalocera*** collected in British New Guinea during 1889-90, under the auspices of His Honour the Administrator. Second Ann. Report of Adm. of B.N. Guinea. Appendix V., pp. 112-115. Brisbane, 1890.

46. The Hessian Fly. Journal National Agricultural and Industrial Assoc., No. 24 (May, 1888).

47. On an Acarus associated with a diseased condition of the Banana. Proc. Roy. Soc. Qd., Vol. IV., 1887.

48. Braula cæca, *Nitzsch*—A Bee Parasite. Proc. Roy. Soc. Qd., Vol. IV., 1887.

49. Bees and Orange Blossoms, Dep. of Agr. Qd. Agr. Journal, Vol. II., Pt. Jan., 1898.

50. Report of Conference of Government Entomologists held at Sydney, N.S.W., 30th July-8th August, 1906, pp. 1-14. Govt. Printer, by authority, Sydney, 1906; and in Rep. Ent. and Veg. Path., 1906-7, separate, pp. 7-10.

51. Rat Parasites (Fleas) and Plague. (Pulicidæ of the Naturalised Rates of Queensland); in Report on Plague in Queensland, 1900-1907, by B. Burnett Ham, M.D., &c. Brisbane, by authority, 1907. *Op. cit.*, pp. 137-160, Pl. III.-VII.

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Photo.: Dept. of Public Instruction.]

PLATE 62.—A LECTURE ON TEETH.

The Travelling Dental Clinic provides a well appreciated service in rural Queensland. Public health is regarded as of the utmost importance, and by this means country school children are taught the elements of dental hygiene, besides receiving qualified dental attention.

THE CULTIVATION OF THE PEANUT.

By N. A. R. POLLOCK, Northern Instructor in Agriculture.*

Description.

THE Peanut, "*Arachis hypogœa*," also known frequently as the earth or ground nut, is a plant of annual habit, belonging to the natural order Leguminoseæ or pod-bearers, and in common with most other members of the pea family has the power of obtaining its nitrogen supply from the atmosphere and storing it up in nodules on the roots.

Unlike other legumes, excepting the Bombarra ground nut, "*Voandzeia Subterranea*," this plant, while blooming above ground, matures its pod or fruit under the surface of the soil. The yellow flowers are borne at the joints where the leaves are attached to the stem, in the bunch or upright varieties at the base of the plant, and in creeper or procumbent varieties right along the stems. Upon pollination taking place the flower fades, and falling off leaves the stalk with a thickened pointed end called the "peg" or "point," which grows down into the soil, where it matures into the pod or so-called nut. It is apparent from this that the soil on which the crop is grown should be of a soft or friable nature or such that a loose surface can be easily maintained.

Range.

The peanut can be grown over the whole of Queensland, and while in the cooler parts it only succeeds in summer, in the tropical portions it may be grown at any period of the year where a sufficiency of rain falls.

The period of growth ranges according to variety and climate from fifteen to twenty weeks; the longest period being taken up by the creeper or procumbent varieties.

A moderate rainfall, plenty of sunshine, and a comparatively high temperature best suit the crop, and departures from these may result in a more lengthened period of growth. The crop can also be grown under irrigation.

Soils.

The nature of the soil on which the crop is grown, besides its fertility, is the main factor in a prolific crop. A loose texture is desirable to allow the pegs to easily penetrate and expand to form the pods and mature evenly, as well as to permit of easy harvesting in freeing the nuts from the soil. Good drainage is also essential, more especially when a heavy rainfall is liable to occur during the growing period.

Light sandy loams are best adapted for the production of peanuts for market as edible nuts, since the shells are clean and bright. Soils inclined to be clayey are apt to stain the shells, and though the berries or peas may be of equal quality, the clean, bright shell, being more inviting, will naturally command a better price. Ill-drained or sour soils are not desirable. Peanuts may be grown on most soils except a heavy or puggy clay, but except in the loose, friable soils they should only be grown for feeding off.

Rotation.

Peanuts should always be grown in a rotation, as though owing to the roots being harvested the same quantity of nitrogen is not left in the soil as with other legumes, where the whole root system is available, a sufficient quantity of the nodule-bearing rootlets are left to exert an influence on the following crop. At Tolga, in a comparison with potatoes grown on land on which the previous crops were maize and peanuts, the yield on the portion previously cropped with peanuts was estimated by an official of the Department to be 9 tons of tubers as against 6 tons on that previously cropped with maize. In the rotation, however, the peanut, when harvested, should not take the place of the legume or other crop that is ploughed under to restore the organic matter in the soil, and should only be looked upon as adding a quantity of nitrogen. Where the whole growing plant is ploughed under it answers the same purpose as cowpeas, Mauritius, and velvet beans, &c.

In orchards, either as a crop to be ploughed under or to be harvested, the peanut is commended.

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* These notes first appeared in the Journal for June, 1922, and again in the issue for August, 1927, and are now reprinted in response to numerous requests from our readers.—Ed.

Fertilisers and Lime.

In common with other legumes, the peanut thrives best in a soil in which there is a sufficiency of lime. Not all soils require the addition of lime, but most soils in districts subject to heavy rainfall, and which give an avid reaction, will benefit by an application of from 5 to 10 cwt. of stone lime or 10 to 20 cwt. of earthy lime or pulverised limestone to the acre, broadcasted (not ploughed in), preferably a week or more before applying commercial fertiliser and sowing the seed. The cultivation of the crop will sufficiently work this lime into the soil. Where any doubt exists as to the necessity of applying lime to the soil, a portion should be limed and the resultant crop compared with a similar area unlimed.

In appying manures for the crop, care should be taken to only apply organic manure in a well rotted condition, and then only in small quantities and thoroughly mixed with the soil. Larger quantities or fresh manures will result in many of the pods being poorly filled. These poorly-filled pods are known as ''pops'' or ''duds.''

Organic manures should be applied to a previous crop to get the best results.

As the peanut is a legume and draws nitrogen from the air, this element is not called for in quantity in the fertiliser, but its presence in small quantity, say, 2 per cent. or 3 per cent., will be beneficial. Phosphoric acid and potash will be the chief elements in the fertiliser, and the quantities will be dependent on the soil content. In general, a fertiliser containing from 10 to 12 per cent. phosphoric acid, 2 to 3 per cent. nitrogen, and 6 to 8 per cent. potash will be a good mixture, and may be applied in quantities of from 1 cwt. to 5 cwt. per acre. Such a mixture can be obtained with 1 part sulphate ammonia, 7 parts superphosphate, and 1½ parts sulphate of potash.

The most suitable application will be discovered by applying varying quantities over a small area and noting results, but usually 2 cwt. is sufficient.

Commercial fertilisers are usually applied immediately prior to planting a crop, and as the roots of the peanut do not spread to any distance, the application in the drill with a fertiliser distributor having one or two tines at the back will greatly aid in mixing the fertiliser with the soil.

Ashes from the forest hardwoods, which contain lime and potash, are useful, and may be applied to the soil broadcast in a similar manner to lime at the rate of about 10 cwt. to the acre. These ashes, however, should not previously have been exposed to rain, as then a great deal of their value will have been lost. The ashes of soft woods growing in the scrubs are not considered so good.

Selection of Seed.

As with other crops, in order to secure the best results it is essential that the seed of the peanut should be of the highest grade. Poor seed cannot be expected to yield a good return. In the first planting, seed should be secured from a heavy producing crop and subsequently carefully selected in the field from the heaviest producing plant of the required type. A good plan is to select the nuts from the best producing plants and sow these in a special seed patch, each year selecting the best of this area for next year's seed patch. Nuts harvested for seed should be fully matured, handled carefully, and not picked from the plants for several weeks after curing; they should then be picked by hand and the selected ones thoroughly dried and stored in a dry place free from mice or insect attack. Storage in tanks in a similar manner to maize is most satisfactory.

Methods of Planting.

The seed can either be planted whole or shelled. Whole nuts may be soaked in cold water twelve to twenty-four hours, drained, dried for an hour or two to assist handling, and then planted. This accelerates germination. Shelled seed should not be soaked.

Where shelled seed is used the shelling should be done by hand, though hand shellers carefully handled are sometimes used. All shelled seed in which the thin skin covering the seed is broken should not be sown, as this injury is liable to affect germination.

Breaking the pods in two answers the same purpose as shelling. Where the seed after planting may be subject to attack by vermin, the seed may be treated by sprinkling with a solution of equal parts of stockholm tar and kerosene. In this case, however, to protect the maturing crop it is advisable to destroy, by poisoning, the vermin beforehand.

Whether planted whole or shelled the operation may be effected by hand or with planters especially designed for the purpose.

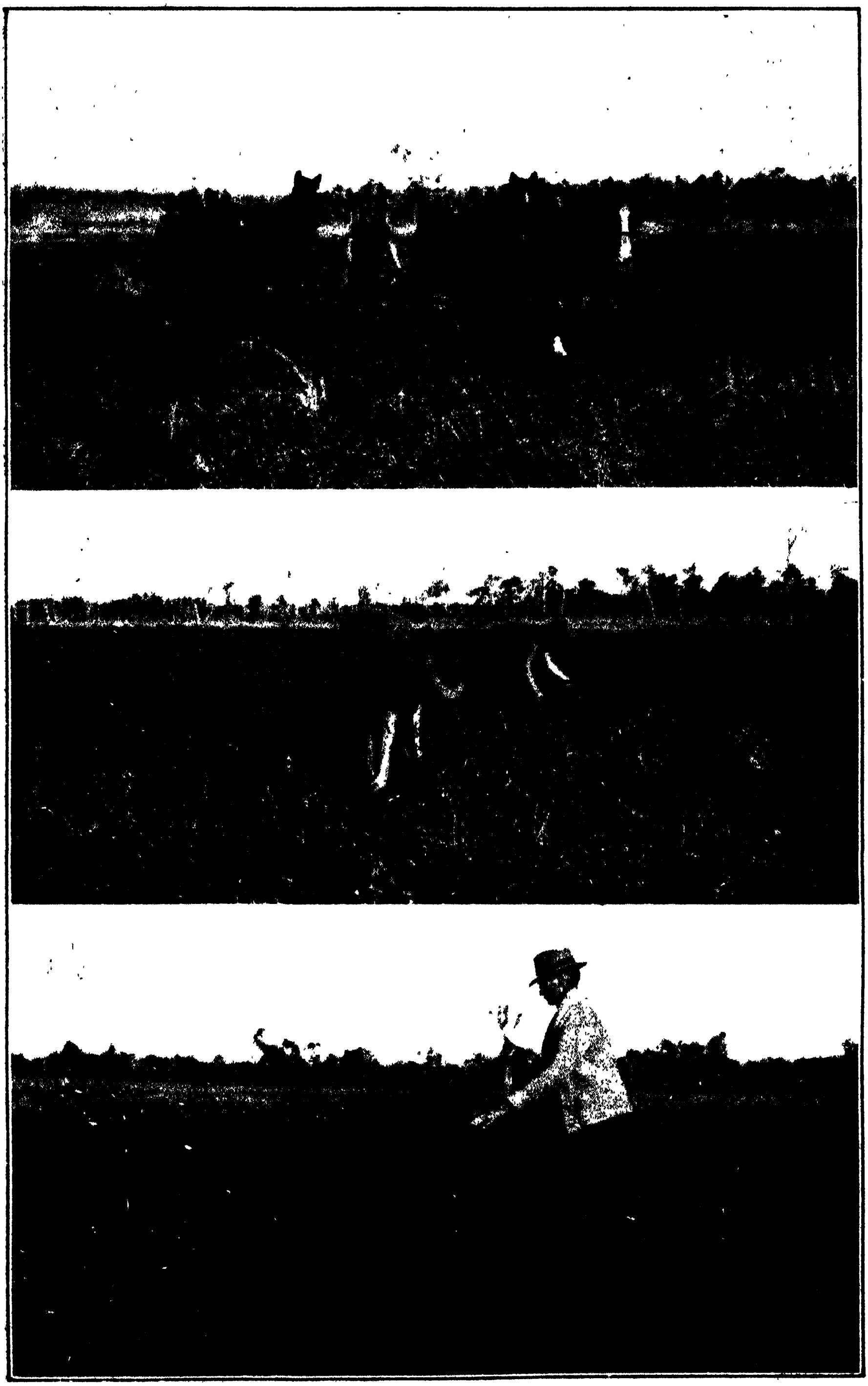


Plate 63.—Peanut Growing in the South Burnett.

Top—Ploughing out prior to stacking. Centre—Lifting peanut roots for stacking. Bottom—Stacked.

Amount of Seed.

The amount of seed required to plant an acre is about 40 lb. of the whole nuts and from 25 to 30 lb. of whole nuts shelled, varying slightly according to the weight of the nut and the distance apart they are planted. Some growers use as much as 60 lb. per acre of the large podded varieties. It is interesting to note that the whole nut, when planted, provides but one plant, but if shelled and the kernels planted apart, two plants will result.

Time of Sowing.

According to the climates of the various districts, so will the time for planting vary.

In the cooler districts, sowings may be made when all danger of frosts is over and the soil can be expected to be reasonably warm, September, October, November, and December being suitable months. In the tropics the crop can be grown practically throughout the year, but consideration must be given to climate and rainfall—i.e., sufficient rainfall should be obtained to grow the crop and fine weather be expected at harvest time.

In the tropical portions of the State, where the monsoonal rain or wet season commences in December, the main crop is sown in January, February, and March, according to the likelihood of reasonably fine weather in the months of April, May, and June or July, when harvesting should occur.

In planting large areas it is recommended to spread the sowings over such a time as will allow of harvesting one lot before the next is over-ripe. Peanuts left too long in the ground are easily detached from the plant and consequently more difficult to harvest, while some varieties are liable to sprout.

Length of Crop.

The large nuts or creeper varieties require a longer time for growth to maturity than do the bunch or upright varieties, the time varying from fifteen to seventeen weeks for the bunch varieties and from seventeen to twenty weeks frequently for the creeper variety.

Preparation of Land.

In preparing the land for peanuts the first ploughing may be deep, but the second should not be deeper than 6 in., preferably 5 in. This top 5 in. should be brought to a fine tilth and be free from weeds and trash.

Where lime or ashes have been applied the land is harrowed and drills drawn out, in which the fertiliser, if any, is mixed and the peanuts sown either by hand or with the planter. The drawing of drills may be done with the fertiliser distributor, or the whole operation can be done with a seed drill and fertiliser distributor combined.

Where no seed drill or fertiliser distributor is obtainable, the drills could be drawn out with a cultivator having a wide shovel attachment in the rear, the fertiliser dusted along this by hand, the cultivator then run along the drill with tines set close in front to mix the fertiliser with the soil, and the shovel attachment set at the back to reopen the drill for the reception of the seed to be dropped by hand; this drill should not be deeper than 4 in. from the levelled surface of the soil, and the seed should be covered to a depth of 2 to 3 in., according to the texture of the soil and its moisture content. In light soils where evaporation is great the deeper planting is preferable, but in stiffer soils the shallower covering should be adopted.

A light firming of the soil over the seed is desirable, and this is obtained in the seed drill by a wheel at the rear. When planted by hand the area may be covered with the harrow, or preferably by the cultivator, with tines straddling the drill and set so as to throw the soil inwards.

Time of Germination.

Germination usually occurs with shelled nuts in five days, but is subject to the amount of moisture and heat in the soil. The whole nuts take longer unless first soaked in water, as the moisture has to penerate the shell to affect the berry or pea which contains the germ.

Spacing.

The intervals between drills and the spacings between seeds in the drills vary somewhat, according to the richness of the soil and the variety planted.

The bunch or upright varieties take up much less room than the creeper or procumbent kinds, and the growth of both is correspondingly greater on the richer soil.

In general, the drills are drawn out from 30 in. to 42 in. apart, the distance being influenced by the space required by the cultivating implement.

The spacing of the seed in the bunch varieties may be from 6 to 12 in. apart, and of the creeper varieties from 12 to 24 in. apart in the drill. An instance of success with close planting is noted from an experiment in width, in a light sandy loam, the bunch varieties were planted 3 in. apart in drills 30 in. wide. It is thought, however, in richer soils this crowding of the plants would be detrimental.

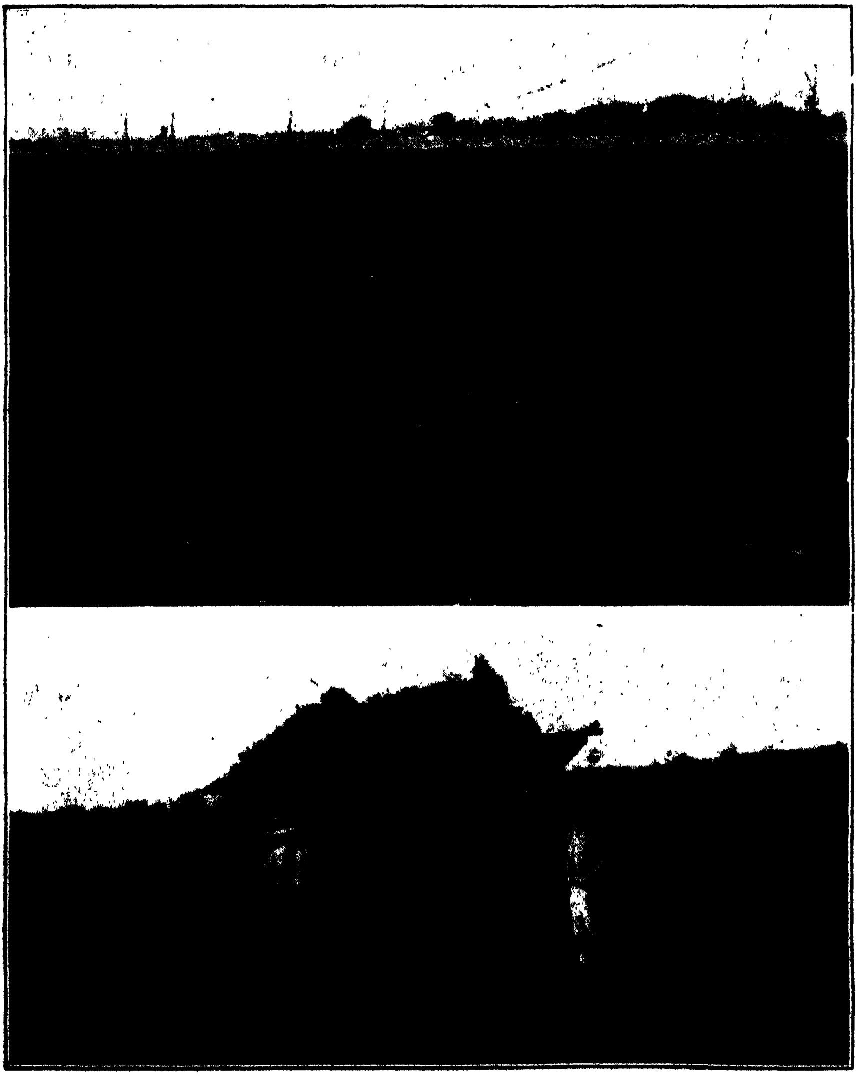


Plate 64.

Top—On a Memerambi Farm—Stacks of "nuts" awaiting transport to the thresher.

Bottom—Topping up the Load—A peanut harvest scene on a Wooroolin farm.

Cultivation.

Where close planting has been adopted the land may be harrowed with a light harrow shortly after the plants appear through the surface. Otherwise it will be better to use the cultivator between the rows and the hand hoe, where necessary, between the plants. The first one or two cultivations should be done with fine points, as in the strawberry cultivator or the 1¼-in. or narrowest shovel points supplied with the usual 5-tooth cultivator; after this the broader points can be used and later the hilling attachments. In early cultivations the cultivator can work close to the roots, but not deeper than 2 in.; but later, after flowering, when the pegs enter the soil care should be taken that the plant is not disturbed.

In most soils it is desirable to draw a little of the soil in towards the plant to provide a bed of fine earth in which later the pods may form, and this can be done at each cultivation, finally leaving a flat bed in which the plants are growing with a water furrow between each drill. The height to which hilling may be practised depends largely on the soil. Usually, the heavier the soil the more necessity for hilling.

Soil should not be thrown on the centre of the plant, the object of hilling being to provide fine soil for the pegs to enter and mature evenly and for ease in harvesting. As a rule, in the creeping varieties the pegs easily reach the soil, but in certain cases a light roller run over the crop will facilitate this operation. In the bunch or erect growing varieties no rolling should be attempted, but a final higher hilling made if it is noticed the points have some distance to go to reach the soil.

Harvesting.

The time for harvesting is noted in the appearance of the foliage, which starts to yellow or lose colour, and by examination of the nuts. If the majority of the berries or peas are full grown and the inside of the shell has begun to colour and show darkened veins, the crop is mature and harvesting should not be delayed.

If the crop is harvested too early the proportion of ''duds'' is very great, while if deferred too long some of the nuts may germinate and others become detached from the plant when lifting, while the tops, having lost most of the leaves, will be of much less value for fodder. In some soils, notably the friable chocolate volcanic loams, the plants may be lifted by hand, when most of the nodule-bearing rootlets are left behind and only the root stock with the nuts are lifted. In other cases it is necessary to loosen the soil before lifting out. In small areas this is sometimes done with the digging fork inserted under the plant, which is lifted while the fork is worked underneath. In large areas a potato digger with an endless belt elevator from the shovel point is found very effective where the soil is dry enough to fall through the slats of the elevator and the crop is free from weeds.

A very satisfactory digger could, however, be made on the farm or by a local blacksmith by attaching to an ordinary wooden plough beam a knife edge to go under the plant and cut the roots just below the nuts; finger bars at the rear of this knife edge would lift the plants and loosen the earth, thus facilitating the lifting by hand. The width of the knife edge should be sufficient between the attaching portions to the beam to allow of the whole plant passing through, and the depth should be regulated by the wheel or wheels in front. Perhaps a better idea might be given by taking the back off an ordinary earth scoop, together with all the bottom excepting 6 in. in front, and substituting finger bars slightly elevated to carry the plants and attaching the whole to a plough beam with handles. In a digger of this description, where one horse is used, the digging attachment would be to one side of the beam, while with two horses it would be in the centre, the operator straddling the row and the depth regulating wheels being preferably two, one on each side of the line of plants.

Where an ordinary plough is used the share should cut 10 or 12 in. wide, and the mould board removed and some rods substituted to prevent the tops being mixed with the soil.

It should always be remembered that the cutting of the roots as close to the pods as possible results in the greater quantity of nitrogen being returned to the soil.

Harvesting should not begin until the dew is off and the tops are dry, and the operation should be regarded as a hay-making of the tops, and not more than can be handled should be lifted in any one day.

Curing.

After the plants are lifted and the soil shaken from the nuts they are allowed to lie either spread on the ground or in small bunches until the leaves are wilted, but not curled or brittle. They are then bound in small sheaves or taken separately and stacked until cured. The time in which the plants are allowed to wilt varies according to the weather, and in some cases stacking may be necessary within an hour of lifting.

The usual method of curing peanuts where the quantity is large is to place them in small stacks around a pole. From twenty to thirty poles will be required for an acre.

These poles should be reasonably stout, from 2 to 3 in. of hardwood in diameter at the bottom end, which should be sharpened. When erecting, holes are made in the

Plate 65.
Peanuts in the shell, Graded for sale.

soil with a crowbar, post-hole digger, or earth auger, and the pole inserted or driven down with a mall to a depth that will ensure their not being blown over with the weight of the stack upon them. Crosspieces about 3 ft. in length are now nailed across the post at right angles, one immediately above the other, 9 to 10 in. above the level of the ground; 3 by 1-in. hardwood battens answer the purpose admirably. According to the crop, six or seven rows are taken on each side of the poles, and the plants, when wilted, forked into one row on either side of the pole. When stacking, a few vines are placed across the crosspieces, which keep them off the ground, to form the foundation. The vines are then stacked by hand with the nuts next to the pole and tops outward, pressing down each layer and building evenly around the pole. From time to time a bunch should be divided and hung around the pole to bind the mass and to assist in keeping the centre high.

This latter is important, in that it allows any rain falling to run off. When the stack is approaching 3 ft. high the vines should be drawn closer round the top and finished off with a cap of grass as a thatch to run rain off. It is important that free circulation of air should obtain through the stack in order to facilitate curing. The building of thick or high stacks or pressing them too tight will tend to cause heating, with consequent damage to both fodder and nuts.

After about two weeks in the stack the peanuts may be stored in the barn, but the nuts should not be picked from the vines until preferably six weeks from the date of harvesting, as if picked too soon they are liable to shrivel, and there is danger of fermenting or moulding after picking.

Picking.

The usual practice in this State has been to pick the nuts from the cured plants by hand—a tedious process, the cost of which, if the ruling rate of wages were paid, would be prohibitive, since 60 lb. is considered a fair day's work. This practice of hand picking has been followed for ages, and is still the usual method adopted in countries such as India, China, Japan, &c., where labour is plentiful and cheap. In certain cases, too, the nuts are washed by agitation in frequently changed water and dried in the sun to obtain a clean inviting article for edible purposes. This is necessarily a costly undertaking, and would need a much higher price for washed nuts to compensate.

Other methods adopted in North Queensland with a lessening of expense have been, in the case of the bunch nuts, to hold the stems in the hand and thresh the nuts off by beating across tightly-drawn wires or the edge of a board placed midway across a box or other receptacle to hold the nuts, and with both bunch and creeper to rub the whole plant over a wire netting drawn tight until the nuts fall through. Subsequent winnowings remove trash and light pods, and it is stated thoroughly drying the resultant nuts in the sun will cause the stems or tails to break off in the bags, resulting in a clean sample when it reaches the market.

In other lands, however, labour and time saving machinery has been evolved which does very satisfactory work in picking, stemming, cleaning, grading, and bagging for market, without breaking or damaging any appreciable quantity of the pods.

Two types of pickers are on the market in the United States of America—one working on the principle of a cylinder grain-thresher and the other one in which the plants are drawn between spring points over a wire mesh in such a manner that the nuts are pulled off and fall through on to a conveyor, which carries them through a winnowing process to a stemming apparatus, after which they go through a further winnowing and a cleaning and grading process. Two machines of the latter type are in use in the Cooktown and Tableland districts respectively.

The cost of machines of this description is too great for the individual in most cases, and it would be advantageous, where any considerable area was under crop, for farmers to co-operate in the purchase, when the machine, which is on wheels, could be transported from farm to farm.

Contract picking is a feature in the United States just as contract chaffcutting is in Australia. The picking crew, working day after day, naturally become expert; so that a greater average quantity is handled daily with less damage than when novices or hands out of practice are engaged.

When a power-driven picker is in use it is advantageous to place it in a central position in the field where the poles with the stacked peanuts can be transported bodily to the machine, resulting in less handling. With suitable uprights with a cross bar attached to the dray a lever with a grip attached to the top of the pole and passed over the cross bar would use it as a fulcrum, when the long end of the lever being lowered to the shaft would lift the pole entirely clear of the ground, allowing of its quick and easy transport to the picker.

The stems or vines of the plant, after the nuts are detached by the picker, can be stacked, baled, or chaffed and used for forage purposes, while the "dud" nuts (small or immature) can be fed to stock.

Marketing.

The nuts are usually bagged whole and shipped to the buyer, but where freights are high it is sometimes more remunerative to market the kernels only.

Special machinery is available to shell peanuts with a minimum of damage to the kernels. Bruising of the kernel at shelling or during transport is injurious, as decomposition is liable to set in and rancidity occur.

Shelled kernels should also be absolutely dry before packing for the same reason. Each variety should be kept distinct, whether shelled or unshelled, as oil millers are understood to give lower prices when the kernels are of different colours.

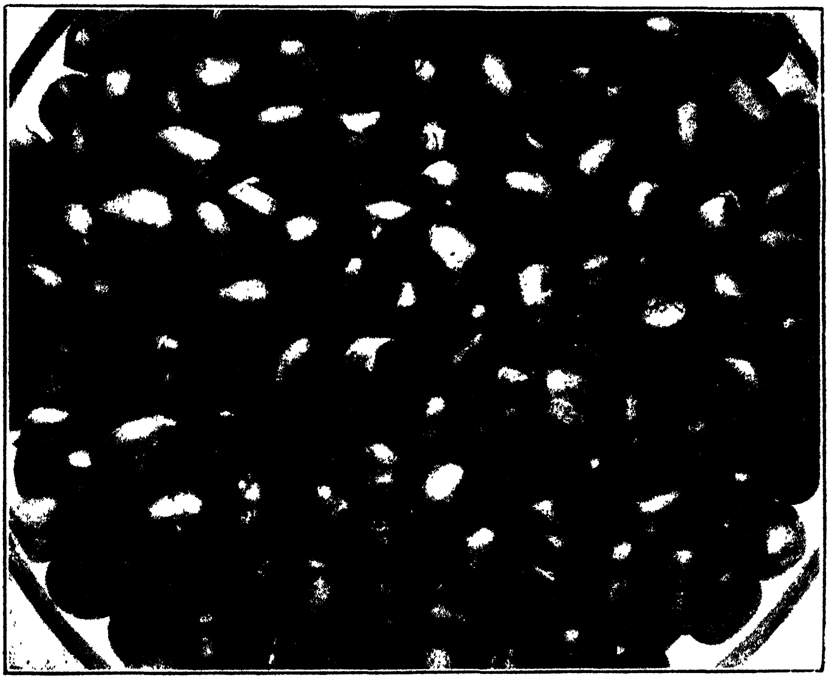


Plate 66.

Peanuts—Graded kernels ready for market.

Diseases.

The peanut is seldom subject to disease when grown under proper conditions of soil and drainage. The most common disease noticed in Queensland is a form of leaf spot (*Cercospora* sp.) which appears as brownish spots on the leaves and is most frequent on sour or poorly drained land. When this appears late it will be possible with the upright growers to mow the tops and make hay before they are too far gone. Another disease that has been noticed on occasion is a kind of fungus attacking the stem where it enters the ground and is characterised by a cobwebby appearance, due to the mycelial threads of the fungus on the stem just below the surface, together with the appearance of minute round white or brown bodies the size of mustard seeds, which are the spore cases of the fungus. A proper system of drainage, together with liming and a rotation of crops, will minimise disease in the peanut as with other crops.

Pests.

Insect pests are of infrequent occurrence, so far the only attack noticed in the State being odd instances of mealy bugs on occasional roots.

Vermin are very partial to the nuts, as are many birds outside those domesticated.

The duty recently imposed by the Commonwealth on peanuts and peanut oil is as follows:—On peanuts from the United Kingdom, 2d. per lb.; other British countries, 3d.; foreign countries, 4d. On edible oils, which include peanut oil:—From United Kingdom, 2s. per gallon; other British countries, 2s. 6d.; foreign countries, 3s.

The protection afforded by this tariff should compensate for the additional costs in growing under white labour conditions in Australia, and peanuts should become a staple crop in North Queensland.

Yield.

The yield of the peanut crop will, of course, depend on the fertility of the soil, amount of rainfall, and attention bestowed.

While it will bear a satisfactory crop under a small rainfall, showing to an extent that it is drought-resisting, it is not injured by excessive rains provided the soil is well drained. An instance of this was observed at Banyan in 1921, where a perfect sample of the Red Cross variety was seen which had experienced a fall of 120 in. of rain in the growing period.

Crops on a small scale have been estimated to produce 3 tons to the acre, and in the North field crops averaging 1 ton and over are not uncommon; but as a general rule, in satisfactory soils and under ordinary conditions with proper cultivation, 15 cwt. per acre might be expected as a fair average yield.

Where the crop grows to perfection, as at Cooktown and the Tableland, there is a fine opportunity for the institution of a co-operative oil mill and the purchase co-operatively of labour-saving machinery in picking, &c. In the growing of peanuts for marketing as whole nuts, it frequently happens that the product is not readily saleable owing to stained shells, glutted market, or other causes, when the presence of an oil mill will be advantageous.

The districts mentioned are in a particularly good position for the establishment of an oil mill, since freight on the whole nuts to the Southern parts is high and a ready market for the cake is to be obtained from the dairymen and pig raisers near at hand.

QUEENSLAND WEEDS.

By C. T. WHITE, Government Botanist.

TWIN LEAF *(Zygophyllum apiculatum)*.

Description.—A bright green, succulent herb (dying a yellowish green), growing in large clumps about 2 ft. high; stems angular, flat on one side and convex or rounded on the other. Leaves composed of a single pair of leaflets; common petiole or leaf stalk, winged, about ½ in. long; leaflets mostly about 1 in. long and ½ in. broad, elliptic in outline, very oblique (i.e., unequal sided, the midrib not dividing the leaf into two equal parts). Flowers, yellow, about ½ in. across on slender pedicels in the upper leaf axils. Fruit (seed-vessel) about ⅓ in. in diameter, five-celled and prominently five-angled; each cell containing a single dark brown, flat seed, 2 to 3 lines long and 1 line broad.

Distribution.—A native (but not found outside Australia). It is found in all the States.

Common Name.—Though very abundant, I have not heard a local name given to it. The Plant Names Committee, the Field Naturalists' Club of Victoria, have suggested the name Twin-leaf for members of the genus, distinguishing the present species as "Pointed Twin-leaf," which is really a translation of the botanical name.

Botanical Name.—Zygophyllum, from the Greek *zygos*, a yoke, and *phyllon*, a leaf, in reference to the paired leaflets; *apiculatum* from the Latin *apiculum*, a little point; probably referring to a little point or appendage at the top of the leaf-stalk between the leaflets.

Properties.—About half a dozen species of the genus Zygophyllum occur in Australia and all probably possess similar properties. They have been accused, both here and in the other States, of being poisonous to stock, but not on very

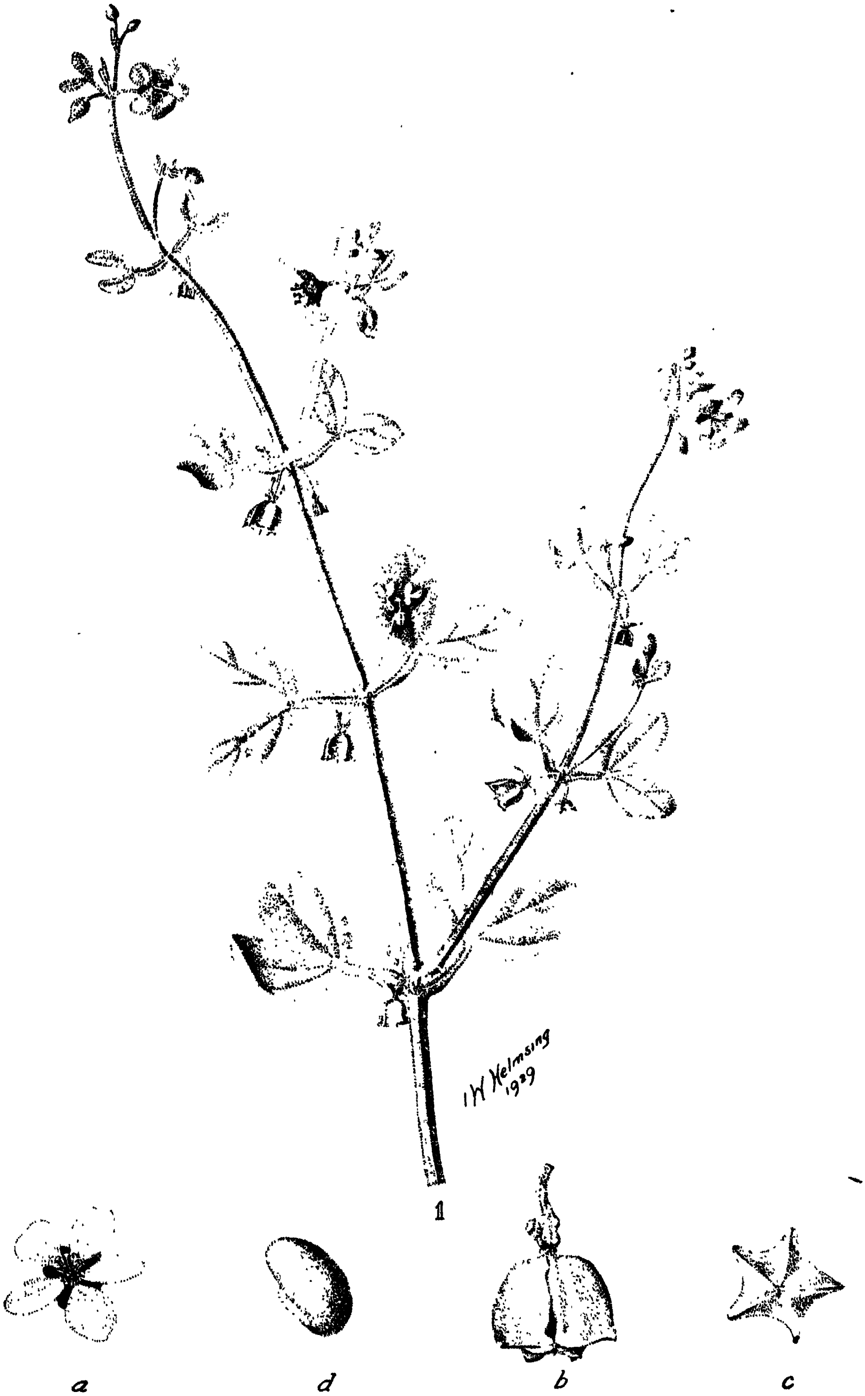


Plate 67.—Twin Leaf *Zygophyllum apiculatum.*

Fig. 1.—Portion of Plant (half natural size).
Fig. 1a.—Flower (natural size).
Fig. 1b.—Seed Capsule × 1½.
Fig. 1c.—Seed Capsule seen from top, × 1½.
Fig. 1d.—Seed × 4.

definite grounds. Though the present species is extraordinarily abundant in parts of Queensland, and during times of drought may be the only green feed seen, I do not remember having seen stock eat it to any extent. The late Mr. J. H. Maiden, however, writing in the "Agricultural Gazette" of New South Wales (Vol. XI., p. 24) quoted Mr. Max Koch, a well-known botanical collector, as stating about Zygophyllums that—"They form, in a good season like the present one, a most valuable adjunct to the winter pasture, providing succulent, if not very nutritious, fodder for both cattle and sheep. My horse is always ready to make the best use of a short halt by feeding on the plants indiscriminately and with a relish, and the cropped appearance of a neighbouring paddock which is stocked with sheep is ample proof of the usefulness of these plants. The foliage being of a watery nature, enables the sheep to do without a drink during the winter months as long as the herbs last, and to feed in the more remote portions of the paddocks. This is a matter of great advantage to the sheep-farmer, for the pasture near the wells (Mr. Koch is speaking of the dry country of the interior.—J. H. M.), which is more or less heavily punished during the ever-recurring spells of dry weather, has an opportunity to recover. They mature seed in abundance, and perpetuate their kind regularly, provided seasonable rains fall at the end of February or the beginning of March." This would seem to indicate that the plants are not poisonous, but have a definite fodder value.

Botanical Reference.—Zygophyllum apiculatum F. von Mueller, in Linnæa XXV., 373, and Pl. Vict. I., 101.

SOLANUM AURICULATUM—A "WILD TOBACCO."

Description.—Large spreading shrub, leaves and branchlets covered with a soft velvety pubescence composed of stellate hairs. Leaves green above, paler (almost white) beneath, due to the dense velvety covering of hairs, petiolate or stalked, with a couple of prominent auriculate (somewhat ear-shaped) stipules at the base of the leaf-stalk, broadly lanceolate or elliptic-lanceolate in outline, large but very variable as to size according to age and growth of the plant. Flowers bluish-purple, on dense heads (cymes) 2-3 inches across at the ends of the branchlets, the heads (cymes) stalked, the peduncle (common stalk), branches, and calyx lobes densely stellate-pubescent. Individual flowers nearly ½ inch across. Berries borne in dense clusters 4-5 inches across; the individual berries yellow when ripe and about ½ inch in diameter, full of a watery pulp and very small straw-coloured seeds.

Distribution.—A native of Brazil, no doubt originally introduced as an ornamental shrub, now one of the most persistent and troublesome weeds on farms in the "scrub" (rain-forest) belts in coastal Queensland. The seeds are carried by birds, and the plants come up in great abundance after a burn. A similar species that smothers farms in the same way is the native *Solanum verbascifolium*. This is easily told by having white, not purple, flowers and no auriculate stipules at the base of the leaf-stalk. Both go by the name of "Wild Tobacco," a name also applied to other Solanaceous plants in Queensland.

Botanical Name.—Solanum; origin doubtful. J. C. London, in his "Encyclopædia of Plants," says, "By some ingenious commentators this word has been derived from *solari* to comfort; the derivation may be possible but the application is not evident"; auriculatum from the Latin *auricula*, the ear-lap, referring to the small ear-like stipules at the base of the leaf-stalks.

Properties.—The berries are eaten by birds (including domestic fowls) freely without ill-effects following. No cases of poisoning by children eating the berries has come under my notice, but, as a general rule, I think they are avoided by them; no doubt in their green state, like most species of Solanum, the berries would be dangerous.

Eradication.—One of the most difficult plants to eradicate; hoe chipping in the young state is probably the most satisfactory: brushing the adult plants and burning off generally results in a fresh crop of seedlings. For satisfactory results the plants must be attacked before reaching the seeding stage, as the amount of seed produced on a single plant is enormous. Arsenical sprays might be tried on the young plants, but we have no definite knowledge of the effect of these on this weed. The following general spray for weed eradication has been recommended by the Agricultural Chemist (Mr. J. C. Brünnich):—

> "Half a pound of arsenic dissolved by means of one quarter of a pound of caustic soda in three gallons of water, and the solution then diluted to ten gallons with water."

Botanical Reference.—Solanum auriculatum, Aiton Hort. Kew. I., p. 246.

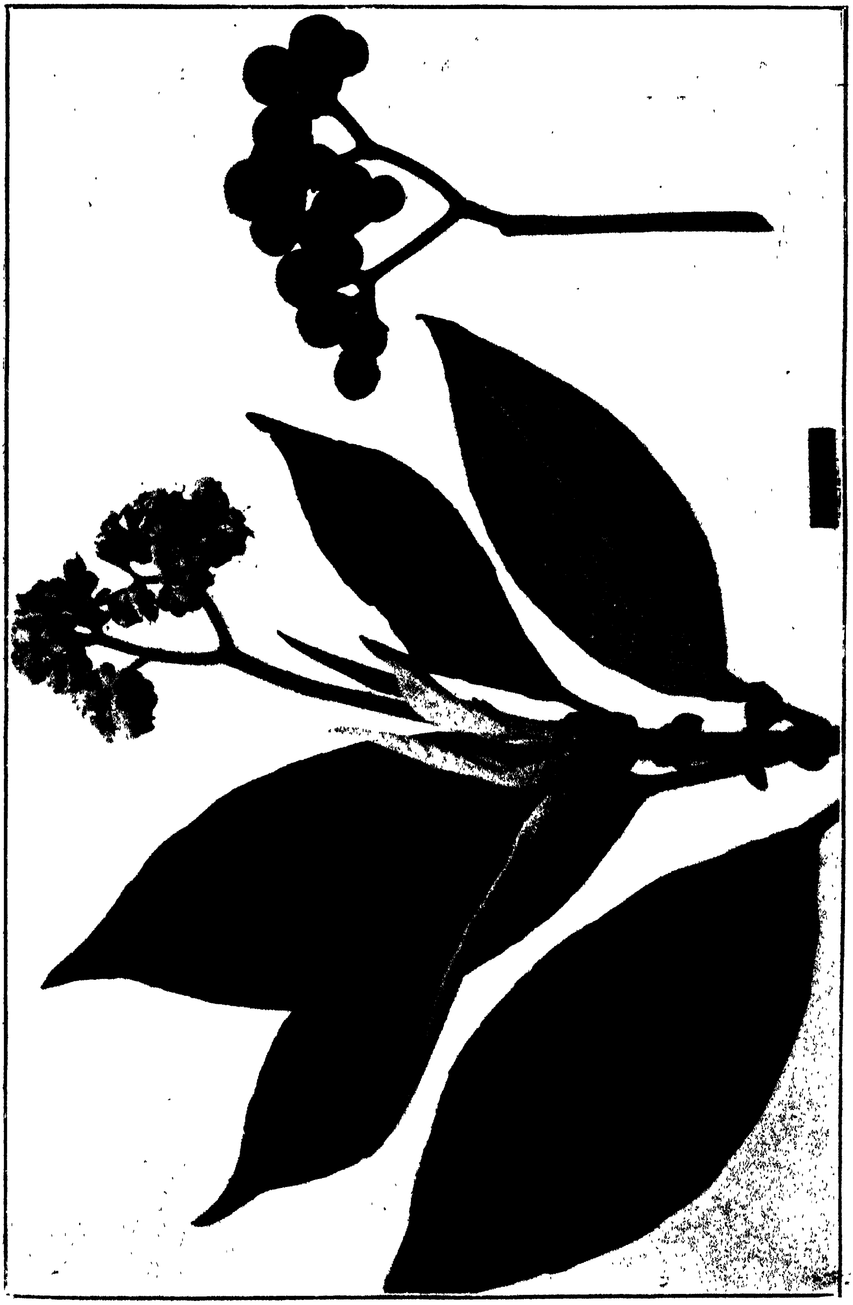


Plate 68.—Solanum Auriculatum.

PLATE 69.—QUEENSLAND AGRICULTURAL HIGH SCHOOL AND COLLEGE—TEAMS MUSTERING AT STABLES.

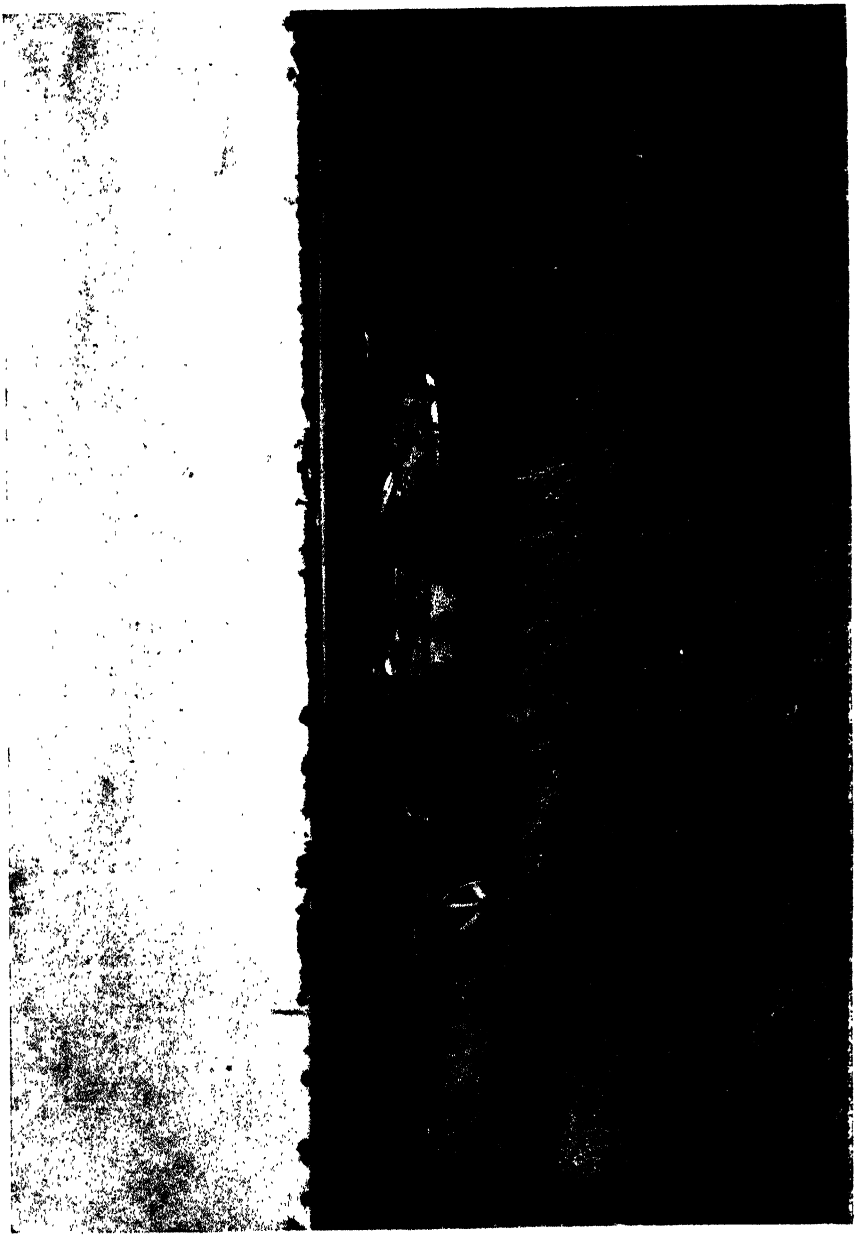


Plate 70.—Queensland Agricultural High School and College—Tractor and Reaper Thresher at Work.

BUDDING AND GRAFTING.

By JAMES H. MITCHELL, Fruit Inspector.

INCREASING the number of plants of any species is known as propagation. Plants propagate naturally in two distinct ways—namely, by seeds and by plant division, and from these natural methods certain artificial methods of propagation have been developed, and are now practised in fruit culture.

All varieties of fruit plants originally produced seeds, and the majority do so at the present time, but as the seed in most cases is produced by the union of elements from two plants, the new plant will have some of the character of both parents, and may resemble neither of them very closely.

For example, a Rome Beauty apple growing in an orchard will very probably receive pollen from some other tree; if the seeds from the fruit produced by this flower are planted they will in turn produce trees that will possess some of the characters of both parents, and it will be impossible to know in advance what the fruit will be like. For this reason plants are not usually propagated from seeds, except for raising seedling stocks. Propagation by division in one of its forms is generally employed for propagating fruit trees.

A method of propagation commonly used for many of the fruit trees is known as grafting. It is the causing of a twig, called a scion, cut from one plant to become part of another. The plant to which the scion is joined is known as the stock.

The different kinds of grafting may be classified in respect to the place where the scion is attached to the stock—namely, root grafting, or the insertion of the scion in the stock at the surface of the ground; stem grafting, or the insertion of the scion on the stem or trunk; and top grafting, or the insertion of the scion in the top or branches.

Grafting is also classified, in respect to the way in which the union between the scion and stock is made—namely, cleft grafting, kerf grafting, bark grafting, whip grafting, splice grafting, veneer and herbaceous grafting.

Cleft Grafting.

Cleft grafting was the method commonly used for renewing the tops of mature deciduous trees (but now superseded by strap grafting), and also for two-year old stocks of vigorous habits. The method is to sever the branch or stock with a saw or secateurs; the exposed part is then split with a grafting tool or chisel, and the cleft is spread with a wedge or similar tool ready for the reception of the scion. The scion is cut to a wedge shape at the butt, one edge of wedge being left thicker than the other, and is set into the stock with the thick edge outside. This will hold the scion firmly in position, and the greatest pressure will be on the outer edges where growth takes place. In order to ensure growth there must be contact between the growing tissues of the stock and scion.

The grafting is done in the spring when the sap in the stocks is then just starting to rise. The scions require to be dormant, and care must be taken to see that they are removed from the parent before the rise in sap, and stored in a cool, moist place. It is usual to leave three or four buds on each scion.

The growing part of a stock is the outer part of the wood just underneath the bark. In making a cleft graft it is usual to insert a scion on each side of the cleft, and if both scions grow the least desirable one is cut away. To complete the graft the union is tied tightly round with string or raffia, and the whole covered with a grafting wax to exclude the air. A grafting wax may be made of the following ingredients:—Resin, 4 lb.; beeswax, 2 lb.; tallow or linseed oil, 1 lb.

The resin and beeswax should be broken into small pieces and melted with the tallow or linseed oil—when thoroughly melted the mixture should be poured into cold water, and when cool enough to handle should be pulled and worked until it is light coloured and grained. In applying the wax the heat of the hands is sufficient to soften it.

Another method for making grafting material, and perhaps as good as the above, especially for grafts at the surface of the ground, is a mixture of clay and horse or cow manure, and covering up with the soil in the nursery row.

Kerf Grafting.

In connection with the grafting of large stocks, a method of setting the scion is sometimes followed differing slightly to cleft grafting. By this method the stock is not split, but a kerf or notch, as long as the scion, is made each side of the stock, trimmed with a knife, and the scion cut wedge-like to fit. It is claimed as an advantage over the cleft grafting that the wound heals more quickly, and the probability of growth is just as sure. A disadvantage of this method is that the scion is not held in position so firmly.

Bark Grafting.

This is a method of grafting that does not injure the stock so much as cleft grafting. The lower end of the scion is cut clean across with a sloping cut 1 inch to 2 inches long and inserted under the bark of the stock after the top has been cut off. It is then bound and treated in the same way as recommended for the other methods.

Whip Grafting.

This method is used almost universally for root grafting, and for small limbs and stocks. In making a whip graft, the stock is cut off and a slanting cut is made at the top of the stock with a sharp knife. The knife is then placed on the cut surface near the top, and the stock is split in the direction of its longest axis thus forming a tongue. The scion is treated in a similar manner, and the two are forced together—the tongues helping to lock the scion and stock together.

Some difference in the size of the stock and scion may be disregarded, provided one side of each makes a good union. When roots are whip grafted it is not necessary to use grafting wax because the soil will keep out the air sufficiently. In making root grafts the scion is made with three or four buds, and the piece of root of corresponding length.

Splice Grafting.

This method is similar to whip grafting with the exception of the tongue. The scion and stock are both made with a sloping cut, brought together and tied in the usual way.

Veneer Grafting.

In this method the stock is cut off and half cut through a few inches lower down, and the piece removed; in other words, the stock for a length of 1 to 3 inches from the top is halved, the scion being treated in the same way and the two brought together and tied and treated as for the other form of grafts.

Herbaceous Grafting.

By this method the stock is not beheaded. A tongue is made on the side of the stock and the scion is cut to a thin wedge shape and inserted between the tongue and the stock. The head of the stock is removed when the scion has made satisfactory growth. By the other methods of grafting the stock has to be severed, and in the event of the scion failing the stock becomes useless, whereas in herbaceous grafting the propagation can rework the misses. This method is satisfactory when applied to custard apple and various other fruits.

Stocks.

The first aim of the propagator is to produce strong, vigorous stocks, best suited for the particular class of fruit tree he wishes to work. As the life and health of a worked fruit plant is largely influenced by the stock on which it was worked, too much care cannot be exercised in selecting the seedlings.

To raise seedling plants, seeds should be selected from well developed fruit, taken from a vigorous tree. On being taken from the fruit, the seed of evergreen trees should be washed, then dried in the shade and immediately planted. With deciduous fruits it is stratified in damp sand until the following spring.

Seed-bed.

A fine, well-worked soil is an incentive to good germination, and the seed should be planted with a covering of up to half an inch of soil, well pressed down, and the bed should be kept moist and well shaded until the seedlings have hardened their first two leaves. The seedlings will require constant attention as regards watering to ensure an even vigorous growth, until within a week or so of transplanting, when they can be hardened off by the cessation of watering. It is not wise to transplant when the seedlings are making young soft growth.

Selection of Seedlings.

When planting out in the nursery rows all plants with curly or malformed roots must be discarded.

Site for Seedlings.

The ground intended for the reception of the seedling in the nursery must be thoroughly worked and brought to a fine tilth. The surest way to do this is by honest hand digging, thus ensuring a greater capacity for holding water, and the admittance of air—both vitally important to the growth of the young seedling.

By making the nursery rows 2 ft. 6 in. apart the use of horse-drawn implements will save time and labour.

In transferring the seedlings from the seed-bed to the nursery care must be taken that they are not allowed to become dry. A proportion of the tops must be cut away to balance the loss of some roots and to allow the plants to adjust themselves to the shift. In most varieties of stocks they are ready the same season for the insertion of the bud, but in the case of stocks for grafting it sometimes takes two seasons.

Budding.

This is a method of propagation more practised in plants than in any other. It consists of inserting a single detached bud from the parent plant under the bark of a seedling or young limb known as the stock. The operation of budding can be performed when the sap in the stock is rising and showing, when the bark is raised, a light green colour, and when mature buds can be obtained. These conditions may be obtained in the early spring and again in the late summer.

Selection of Bud Wood.

The buds used for budding must be selected from a proved productive tree of vigorous habits and growth; clean healthy shoots with well developed buds are essential. In all these operations it is hardly necessary to state that the tools should be first class and keen-edged.

When Buds Fail to Grow.

There are times in the budding season when the buds fail to grow although the bark of the stocks is lifted. This is explained by a study of the growth of a plant. When the sap is moving upwards a jelly-like mass is deposited on the outer surface of the wood under the bark and there is a thickening of the girth of the plant. In its descent the sap follows a different course—merely hardening the jelly deposit with no increase in girth. One of the surest signs to follow for successful budding is to note the colour when the bark is lifted. If it is a light green colour the time is favourable; if, on the other hand, it has assumed a yellow appearance, it is better to wait for the next upward flow of sap. The operation of budding in itself is quite simple and a good result is easy of attainment, provided the necessary conditions before mentioned are observed.

The stocks are allowed to grow until they are the girth of a pencil or somewhat larger, and the bud is usually inserted at or near the surface of the ground.

For the reception of the bud a T-cut is made—the cross cut is usually made first and after making the last cut the knife is twisted to right and left before taking it out, in order to loosen the bark. The bud is cut off the bud stick as close as possible to the bud and with about half an inch of bark on each side of the bud.

Some propagators advocate taking the small portion of wood behind the bud out before insertion, but it is not absolutely necessary. The bud should be tied in its place fairly tightly, beginning the tie at the bottom end.

Tying Material.

Raffia makes a satisfactory tying material, provided it has been moistened with water before it is used. At the expiration of ten to fourteen days the tie must be cut, otherwise girdling of the stock will result. When the bud is set late in the autumn it does not start into growth immediately, but remains green and dormant until the following spring when it starts into growth.

Stimulating Growth of Buds.

When buds are slow in starting into growth the stock cut partly through causes more sap to be directed to the bud; on no account at this stage should the stock be completely severed.

In several varieties of fruit trees the young growing tree is trained to a stake to keep the stem perfectly straight.

The young trees at a certain stage are headed to form the permanent head. This operation is not performed until the tree has attained at least a foot of growth above the desired height, thus ensuring a good firm stem and fuller buds.

Budding old Trees.

This method of budding can be carried out on old trees, but as it is a difficult matter to insert the buds under the old hard bark of the stems and branches, it is usual to head the trees back to the desired height and allow them to make young shoots. These can be selected and budded on the following season. Trees headed back during winter may generally be budded the following autumn.

In Arching.

This method is really grafting by approach, inasmuch as the stock is taken in a receptacle, or planted in close proximity to the tree from which it is desired to propagate.

Bud Selection.

It is evident that trees worked by budding and grafting will possess all the good or bad characteristics of the parents; such being the case, it is very important that every care should be exercised in the selection of scions and buds from only the most prolific, high-class, vigorous trees.

Stock in Relation to Growth.

It has also been proved that a vigorous tree is retarded in its growth if stock of a less vigorous strain is used for the reception of the scion or bud. It is a fairly safe rule to work most varieties of fruit plants on stocks of their own genus, as, for example, sweet orange on sweet orange stock, lemon on lemon stock, peach on peach stock, anona cherimoyer on anona cherimoyer.

Although nearly any bud on a tree may be successfully inserted and made to grow, only clean, healthy shoots with well-developed buds should be selected; these will develop into strong, vigorous trees and be less likely to be attacked by disease.

FALL IN LOVE WITH YOUR WORK.

''We are fortunate in our manager—he is more than capable, he is in love with his work.'' That is what a man of many business interests said to ''Country Life'' the other day, in discussing a certain business. Isn't that the sort of man we are all looking for?

Yes, he is hard to find. Every executive worth its salt is on the lookout for him, and holds on to him when they get him. To be sure, there is a limit to what they can pay him, but they will pay up to the limit—and perhaps risk a bit extra.

The man who ''watches the clock'' or has a grouch against ''the boss'' will never go far—in that business. The probability is that he will not succeed in any other. His policy to do no more than he is paid for, means he will never be paid any more than for what he does—and he is cramping himself as well as his business. Mediocrity, or worse, is a-yawning for him.

It comes back to this: Every employee is directly interested in the business that pays him wages or salary. He is a partner in the concern, and its success is his success. This applies to business and industry throughout Australia, and the sooner it is really recognised the more likely we are to arrive at sound industrial relations.

You know how it is on station or farm. You would like your employees to take a personal interest in the products, and to rejoice when they top the market, or make a particularly good sale, or carry off the prizes. We believe this happy relationship exists on a great many country properties. The best advice that can be given is, ''encourage it.'' We want to see it fostered in shop, and office, and factory.

Likewise, the best advice to employees is, ''Fall in love with your work''—that way lies success. If you cannot fall in love with your present work, work up to the work you can; or, if necessary, change your work. As a witty American puts it: ''An artist is a man in love with his work.'' Let's all try and be ''artists.''—''Country Life'' (Sydney).

STOMACH WORMS IN SHEEP.

The sheep should be drenched with a mixture of arsenic and Epsom salts. The ingredients are 2 oz. arsenic (95 to 98 per cent. purity), 6 lb. Epsom salts, to 5 gallons water.

To prepare.—Bring 2½ to 3 gallons of water to the boil, then add the 2 oz. of arsenic and the 6 lb. Epsom salts. Stir and bring to a brisk boil. Boil vigorously for about five minutes and stir well. Then allow to simmer for half an hour longer, stirring occasionally. Add cold water to make up to the 5 gallons. This mixture will now be ready for immediate use.

Dose for grown sheep, 2 fluid oz.;

For weaners, 8 to 15 months, 1½ fluid oz.;

From 4 to 8 months, 1 fluid oz.

Lambs under three months old should have the dose reduced according to size and age of lamb. If the milk secretion is good, the lambs will not need drenching, but if eating grass freely they will pick up the worms and suffer more severely owing to their weaker constitution, therefore drench them if necessary. A flask can be procured suitable for administering the drench according to dose, otherwise a sauce bottle will be found suitable, but will require to have the dose measured properly. The sheep should be kept away from food and water for at least twelve hours before drenching (if not already starving), and about four hours after drenching (at least from water).

The sheep should be on all fours while being drenched, the operator holding the sheep between the knees with the left hand under the jaw and the right hand administering the drench with the flask. Should the sheep struggle or cough, discontinue pouring the drench and wait till the sheep becomes normal before continuing. It is usually found most convenient to run a number of sheep into a narrow lane (about 30 in. wide) for drenching purposes.

The worms hatch out freely with moisture during warm weather, at which time they increase quickly, but usually cause very few deaths until autumn and winter. Spring is the best and most effective time to drench to keep the worms in check. To reduce the worm trouble, the first two drenches should take place at intervals of eight days, and then continue the drenching at intervals of twenty-four days during summer and autumn. In doing this, with a change to fresh pasture, the sheep may be got free from worms after fifteen months' treatment.—J. Carew, Senior Instructor in Sheep and Wool.

BLUESTONE DRENCH FOR STOMACH WORMS—

(STRONGYLUS CONTORTUS).

As a change from the arsenical drench, the bluestone and mustard drench can be successfully used, say, every third or fourth drench. The ingredients are 1 lb. bluestone, 1 lb. fresh mustard, 10 gallons water.

To prepare.—Suspend the bluestone in soft or rain water, secured in a piece of hessian. Mix the mustard in a little water until thoroughly moistened, then dilute with larger quantity and mix with bluestone water, which is made up to the full quantity of 10 gallons.

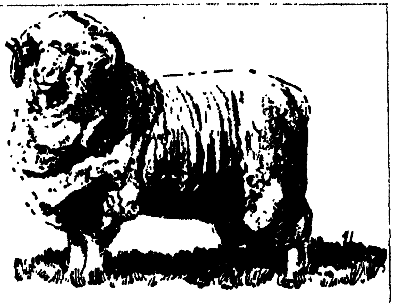
When all the bluestone is dissolved, it should be well stirred, and administered in correct doses.

Grown sheep, 4 fluid oz.;

Weaners, 12 months old, 3 fluid oz.;

Lambs, 4 months old, 2 fluid oz.

The bluestone water should not come in contact with metal; wood or enamelware is suitable. Care must be exercised in administering this drench, as it is a bigger dose than the arsenical dose, and takes longer to swallow. The sheep are more apt to take it on their lungs, which is injurious and may prove fatal. This drench is useful if administered after giving the sheep the same treatment as recommended for the arsenical drench.—J. Carew, Senior Instructor in Sheep and Wool.



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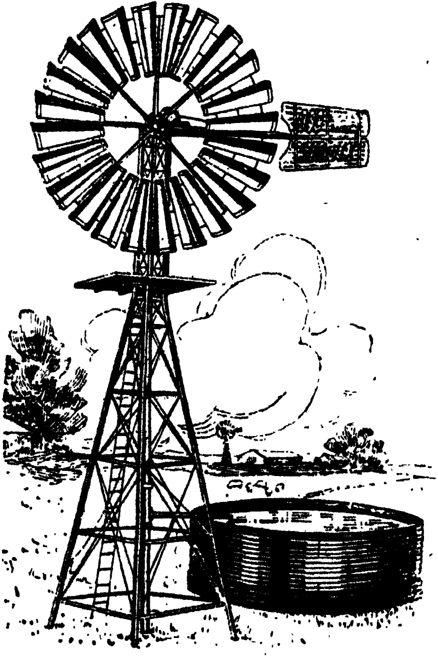

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CATTLE BREEDING AND WORK.

By H. ANNING, Wetherby, via Richmond, Q.*

I MAY mention at the outset that in writing about cattle I am merely giving utterance to the results of my own experience and observation for the consideration of the uninitiated, and have no wish at all to lay down the law to cattlemen. It is a big subject, and as one old timer said to me once: "You can never learn the lot of it." Seldom can two cattlemen be found to agree on the subject, even after spending their lives at the game.

The Importance of a Quiet Herd.

One statement may be made, with which all must agree. Of course, the chief end, aim, and object of men engaged in cattle raising is to make money, and to do that it is essential to have a quiet herd. Different men may argue as to the means whereby cattle may be thoroughly quietened, but I believe cattle are something like men, *they want a home*, and a nice one at that. Therefore time and money spent in picking good camps, well shaded, soft, and handy to water, and the thorough breaking in of cattle to those camps, is very well spent indeed. Weaners should be herded regularly every year, and by a good man. The best man is none too good. They should be fed and watered every day as carefully as fat bullocks, put on the same camp every day at lunch, where it is advisable to have some salt in troughs. From a month to five weeks is long enough to keep them in hand. They will never forget the handling or the camp.

Types of Cattlemen.

Speaking of cattle, the figure of one man rises before my eyes—James Tyson, the cattle king. He was a great man, honest with himself and the world, shrewd, clever, and observant; a fine bushman, a good man over men, and one who knew how to pick his men. Living and working hard himself, he expected his men to do likewise, consequently he was often bitterly reviled. Of the many stories told about him, one is most instructive. When he was quite a lad he had the hardest job he ever took on. His work was to hold cattle on new unfenced country. Cattle don't like leaving their homes. If taken away from sour, poorly grassed country, and put into richly grassed paddocks they will hang on the fences and sulk for months. Placed on unfenced country, they will naturally keep making back, and once started they waste very little time, making across country in a direct line—they are fine bushmen. It takes months and months of careful patient work to settle them down on new pastures.

Tyson found his job was no joke. Getting up early, he used to put a bit of tucker on his saddle and ride round the tracks. When he found any heading back he followed these until he overtook the cattle, sometimes having to ride 30 to 40 miles before coming up to the leaders. Then he had to drive them back, watching them on his own at night. After these jaunts he used to arrive back, hungry, sore, and exhausted for want of sleep. It was hard, unthankful work, and the cattle never seemed contented. He was decidedly pleased when he got another job.

An old chap, with a white and patriarchal beard, took over from him; a slow peaceful-looking old joker. Probably he never put a horse out of a walk! "My word," thought Tyson, "there won't be many cattle here in three weeks' time." However, he was wise enough to say nothing. Months afterwards he came back, and rode up to the old chap's camp. He was asleep! Tyson woke him up, and the old man asked him to stay for the night. In the course of conversation he told him the job was all right, but a bit too lazy-like. The cattle were quiet and settled down. To verify these astonishing statements Tyson took a ride round next morning with his host. What he saw fully bore out the old man's assertions. "The difference between us," he said, "was that the old man understood cattle, and held them with about one-tenth of the riding I had to do, and the longer he stayed on the job the quieter the cattle became, until finally he found it a bit lazy."

Because Tyson was able to learn vital lessons so quickly and easily must have accounted for much of his success in after life. Tyson was a great man all right, and nothing was more typical and characteristic than his final leave-taking. He knew his hour was nigh, but he make no fuss, and worried no one. He had done his life's work, and was about to turn in for his last camp. He was content to pass out, and let the future unfold itself.

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* In the "Pastoral Review" for June.

The "Galloping Musterer and Others."

I have met many different kinds of cattlemen. There is the "galloping musterer" (usually a young man). He wears fierce-looking spurs, carries a diamond-plaited whip, with curious ornamental handle, a cabbage-tree hat, and often a beautiful silk handkerchief around his neck. He will ride anything and through or over anything. He starts away from camp just after daylight at a gallop, and men and boys follow, through timber, over holes, &c. He pulls up for a few seconds and in a breathless way tells Joe to take Jimmy and Friday and clear down to One-Tree Camp. Starts off again and repeats the order to two or three others anent another piece of country. All his work is in keeping, and young men adore him (as a rule).

The best I have seen were old slow-going chaps. One in particular I have in mind told me he had no time for cattle, but preferred billiard-marking, only he couldn't live in town. I was somewhat young when I met him, and fancied myself more than a little, and felt rather a contempt for the old chap and his sentiments. He was a little roly-poly of a man. No leggings or whip, and only one short little rusty spur. He rode a rather unambitious sort of prad. He had a rowdy herd of "baldies" to deal with, and was just commencing a bullock muster. I knew the country and the cattle, and expected the old fellow to resign after a week's work. However, he jogged placidly out, and commenced to split up the men. By 10 a.m. we had the camp on, and there had been practically no galloping. He always seemed to be just where he should be to stop a mob from galloping.

When the last man came in with a lot, he rode out. "Hullo!" he said, "you've missed some cattle. There was a big bullock running out there with a white stripe along the ribs, and there were ten or eleven other bullocks with him." He cantered out, and after a little while brought them along himself, with the help of a young new-chum lad. He sauntered through the muster and made a good delivery, and after a while men and boys began to think that it must be something more than good luck. Cattle on that place steadied down marvellously. He could ride up to a camp, and the cattle did not even trouble themselves to get up and stretch, and that is the way cattle should be before much money can be made out of them.

PIONEER DROVERS—A DISAPPEARING BAND.

By WILFRED STEELE, Yeeda, via Derby, W.A.*

WITH the various railway systems of the Commonwealth encroaching further into the vast interior of Australia, long overlanding droving trips are now few, but the following narrative will recall some famous cattle droving feats, and perhaps serve to show the danger and hardships encountered in opening up the distant tracts of country in the Northern Territory and Kimberley.

In 1872 D'Arcy Uhr overlanded the first cattle to Darwin, although cattle had years before this penetrated into the Territory along the Queensland border line. The next man to follow was Tim Nelson, who journeyed a mob of 100 bullocks along the overland telegraph line from Undoolya to Darwin; this station is near Alice Springs, in the heart of the continent. Three years later followed Nathaniel Buchanan, known throughout the North as "Bluey," with cattle from Rule and Lacey's station, Aramac, in Central Queensland. These cattle went to Glencoe Station.

Alfred Giles in 1878 left Chowla Station, on the Darling, with 2,000 cattle and 10,000 sheep, proceeding down the Murray across to the Burra, on to the Peake Telegraph Station, and along the overland telegraph line to Katherine River. These cattle formed the nucleus of the herd for Springvale and Delamere. Springvale was later abandoned, and Vestey's Manbuloo now occupies that area. The sheep and cattle later went on to the shorter and more nutritious pastures at Newcastle Waters, 260 miles south of the Katherine, and the sheep were finally removed from Newcastle about 1902. This run has long been the property of Messrs. Lewis and Sir Sidney Kidman.

This trip of Alfred Giles and his brother, in my opinion, takes the credit of all pioneering trips in the history of Australia. By far the major portion of the distance travelled, about 2,200 miles, was over unoccupied country, and it was necessary for well-sinking parties to travel in advance of the stock to sink wells and scoop for water in the sandy river beds. The trip occupied just on two years.

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* In the "Pastoral Review" for June.

In the vicinity of Alice Springs natives lured from the droving camp some of the boys of the party and murdered them. Fifty years have gone by since this intrepid overlander accomplished this famous trek, and he resided at his station, Bonrook, near Pine Creek, until a few years ago. He is now living at Adelaide, ripe in years, rich and unique in experience, and it is regrettable that he has not received some suitable recognition for his great achievement. Honours are won for far lesser feats to-day.

Mr. Giles is the father of the late Lady Campbell, a very heroic woman, who died a few years ago at Waterloo Station, in the Wyndham district. His great enterprise was on behalf of Dr. William James Browne, a pastoral pioneer of South Australia, who controlled Leigh's Creek, Nilpena, Wilpena, Wonaka, Arkaba, Booborowie, Moorak, and the famous Buckland Park, in addition to many other smaller properties. Dr. Browne's brother, also a medical man, accompanied Captain Charles Stuart in the historic expedition of 1844.

Arrived in Darwin also in 1879 with bullocks, Frank Hann, of Lawn Hill Station, near Burketown. Hann, small and slight of stature, but with the heart of a lion, did much exploratory work in different parts of Australia. He did extensive peregrinations amongst that rugged country of the King Leopold Ranges, between Derby and Wyndham. Many of his marked trees I have seen on the Charnley River and elsewhere, and on several of these I cut away the encroaching bark that was gradually effacing Hann's markings (FH over 1898).

Hann took up Grace's Knob, a rugged run on the outermost limit of settlement, 200 miles north of Derby. The Hann River, the largest tributary of the Fitzroy, is named after him. He also blazed the track from the goldfields to Oodnadatta, and crossed and recrossed that illimitable plain of mirage and thirst, where to-day speeds the luxurious "Trans." train. Hann died several years ago in straitened circumstances.

The influx of cattle into the Northern Territory in the early eighties went on apace, and the following drovers came across from Queensland with cattle for stocking purposes:—Scrutton, Burke, Blair, Fraser, Hayes, Wallace, and Redford. The first named long resided at Borroloola, where he owned Bohemia Downs, and he was also one of the pioneers to Somerset, on the apex of Cape York Peninsula. Redford was also resident near Borroloola, as the manager of Amos Bros. and Broad's Macarthur River Station.

In 1882 "Bluey," brother of W. F. Buchanan, of Killarney, New South Wales, again entered the Territory with 7,000 cattle on behalf of Fisher and Lyons, to commence what is to-day Victoria Downs. Farquharson the same year also contributed with a mob to form the nucleus of this herd, which is to-day about the largest in Australia.

On 15th October Saunders and Johns arrived on the Katherine overland from Roebourne, Western Australia, on an exploring quest. They took a route different and more direct than that of Forrest, two years previously. These were the two first parties from the West to the overland telegraph line.

James Warley entered the Territory also in 1882 with cattle from the Moonie and Balonne Rivers in South Queensland. This was a very long trip, with the destination at Glencoe. Settlement in the following years continued to penetrate still further west, and Sam Croker passed the O.T. line with heifers for W. F. Buchanan's Wave Hill Station. This famous run later branded 25,000 calves in a season.

In March, 1884, W. Button passed the Katherine with 2,000 odd breeders to stock the country acquired by Osmund and Panton, on the Ord River in Western Australia. Other mobs followed to stock this country also, and it eventually became a very large herd, now held by Vesteys. "Bluey" Buchanan took a prominent part in the stocking of the Ord, and altogether his part in the opening up of the Northern ranches was second to no other. The Ord River cattle came from Avington and Beaufort, and the trek across Queensland, the Northern Territory, and into Western Australia was a most creditable performance.

In 1885 and 1886 two families that overlanded across to Western Australia were the McDonald Bros. and the Durack Bros., and their names are still to-day associated with the country that they pioneered. The trip of the McDonald's is, I think, the longest on record, and, in my opinion, the only one to challenge that epic feat of Alfred Giles. They left their Goulburn home in New South Wales with cattle and bullock wagons, crossed Queensland, thence by Settlement Creek over the Territory to Hall's Creek, followed the course of the Margaret River down (now the famous Gogo Station of the Emanuels, taken up by the astute head of that house, Isidore Emanuel), and finally halted at Fossil Downs, where they built up a large herd of cattle. This station is situated about the junction of the Fitzroy and Margaret Rivers, some 230 miles from the cattle shipping port of Derby. This feat of the McDonald Bros. is a record in that it penetrated the furthest west. For nearly two years every morning at early dawn the heads of the bovines were pointed west for something like 2,500 miles, and when the distant goal towards the setting sun was eventually reached, it was with the original herd much reduced in number. Dan McDonald, of Goulburn, owns Fossil to-day.

The name of Durack has always been intimately associated with the early settlement of Kimberley, and they are still large landholders in the Wyndham district. The Durack Bros., like the McDonalds, overlanded their own cattle from Queensland, being settled about the Cooper River. Losses in cattle overlanded by them greatly increased the expenses per head of those finally delivered. Mr. M. P. Durack represented Kimberley in Parliament a few years back, and last year was chairman of the Beef Commission, inquiring into the disabilities of the industry, and no man is better versed than M.P. on the cattle question of the North.

There are other names of early overlanders that I have omitted to mention. Most of these pioneer drovers have gone still further west to attend the final muster. They have all played a prominent part in the opening up and development of these far-flung Northern ranches, but their great exploits will soon be entirely forgotten, and I trust that the powers that will be—when the railways cross from east to west, over the great droving route—will perpetuate the names of these pioneers by naming the stations after them, and not choose names of politicians as on the "Trans." east-west route.

The early droving route took the course of the coast, named so, but actually many miles from the shore of the Indian Ocean. The present tableland track was then unknown, and many of the mobs were held up by drought for months at a time, the road ahead had to be explored in advance of the cattle to find water supplies for the watering of such large mobs, rations—rough in those distant days—were unprocurable over immense distances, natives were hostile, and disease was rampant with man and beast. Droving was a very different occupation in those days to now.

The writer, in April of 1904, was a member of a party that took the first cattle east from Wave Hill, and accompanied them for thirty-one weeks, covering waterless stages of 95 and 60 miles, so is in some small degree qualified to judge what droving hardships must have been to those pioneer drovers.

From 1904 the route from the Victoria has been via Murranji to Newcastle Waters, and the line of trek is marked by many graves on the roadside—those who have fallen out on the march from malaria and berri-berri. Remote was the chance for one that seriously fell ill on this stage. The drover, often short handed, had to proceed on with the cattle, and there were many lonely deaths, with only the omnipresent willy-wagtail to twitter a requiem.

That some of the droving trips of more recent years were no picnic, I recall the overlanding of 2,000 odd bullocks from Lissadell in 1905, in charge of Walter Rose. This was a very dry year, and the Tableland route impassable. Rose, taking the old established coastal track towards the Katherine, found his progress beyond the Roper stayed, and yards were built to hold the bullocks. Then disease broke out in them, which necessitated letting them go and riding the tracks, the cattle attempting to go back west. Rose then journeyed down to Newcastle Waters for nearly 200 miles to find impassable dry stages further south and east. This indomitable drover again headed for the coastal route, and when near Macarthur River Station left the track and went sheer bush towards Westmoreland. So rough was the going on this cross-country stage that the plant dray was abandoned, and is likely to be there to this day, or what the white ants, bush fires, and brother "jacky" have left of it. Three men died in this party, and for hardship and distance this trip is well in the front during the last quarter of a century of droving. Some of these cattle travelled right into Bellevue, the late Lumley Hill's beautiful station near Brisbane.

The first drovers to lift cattle from the western ranches to the east went out in 1903, and the following year "Jumbo" Smith and Blake Miller lifted Victorias, also Steve Lewis, John Dick Skuthorpe, and Charles Phillot came in with Wave Hills. All these mobs comprised from 1,000 to 1,500 bullocks, and this was the opening of the cattle route via Murranji.

Many of those early pastoral pioneers like Dr. Browne and C. B. Fisher lost an immense amount of money on these Territory ventures, and those that have followed have not yet been rewarded on their enterprises. The industry in the North is still depressed, virtually on its back, and those that hang on look and wait for something that never comes—a boom!

HOW THE THOROUHGBRED HORSE CAME.*

WITH England rests the proud achievement of having given the Thoroughbred horse to all the civilised nations of the globe. Nevertheless, the horses upon whom have been bestowed the title "Thoroughbred" can in nowise be reckoned indigenous to the soil of Britain, being, so to say, a manufactured article. The word Thoroughbred only came into use after the introduction of Eastern blood into England, and was alone given as a title of distinction to the progeny of the Royal mares imported by Charles II., and other mares of purely Eastern blood, and their descendants, begotten by Eastern sires and their descendants, whether imported from Arabia, Barbary, Turkey, or Persia.

Early Sires Imported.

Thanks to the love of horses inherent to many of the great nobles and wealthy commoners of England, they commenced to improve the native breed by the introduction of Eastern blood as early as the reign of King James the First, who set them the example by giving Mr. Markham, a merchant trading to the Levant, 500 guineas for an Arabian, described by the Duke of Newcastle as "a small bay horse of not very good shape"; and as there is no account of any of his progeny having distinguished themselves he could have done the State but little service.

The two next Eastern sires of note brought into England were the Helmsley Turk and Sir Thomas Gresley's bay Arabian. The former, who was imported by Henry Villiers, the great Duke of Buckingham, had a most distinguished career at the stud, being the sire of Mr. Place's Bustler (a name to be found in all the best old pedigrees), and Mr. Cooke's Vixen, who was out of the Barb mare who bred Dodworth, the first Anglo-Barb foaled in England.

Gresley's bay Arabian, who was brought into England a year or two later than the Helmsley Turk, was put to the latter's daughter Vixen, with the result of getting the Old Child mare, the great-grand-dam of Mr. Heneage's Silvertail, who bred Careless (winner of twenty races) and Fearnought (winner of five races) to Regulus; while she also bred Warren's Sportsman (winner of seven races) to Cade, when Pot-8-os and all the grand horses descended from that equine celebrity.

Some Turks went to England.

During the reign of the unhappy Charles I., from 1625 to 1649, there is no account of any Eastern sires of note being brought into England beyond the D'Arcy White Turk and the D'Arcy Yellow Turk; but when Oliver Cromwell ruled the realm under the title of Lord Protector, General Fairfax imported the Morocco Barb, maternal ancestor of Besto, while his studmaster (the same Mr. Place as owned Bustler) imported the White Turk, subsequently known as "Place's White Turk," who did the State no little service, and was a great help towards laying the foundation of the British stud by getting Mr. Croft's Commoner and Wormwood, while he was also the maternal great-grandsire of Cartouch, Grey Ramsden, and Windham, all horses of very high form.

Soon after the Restoration, with Charles II. on the throne, both breeding and horse-racing received an impetus from the Merry Monarch's love of sport as well as of fine horses. He caused the Barb mare in foal with Dodsworth mentioned above to be imported, and also a number of Arabian and Barb mares, on whom the title of "Royal mares" was bestowed, but his Master of the Horse, Mr. Fenwick, failed to obtain any Eastern sire of note for his Royal master.

In the reign of James II., however, there was brought into England by the Duke of Berwick from the siege of Buda (1686) a sire destined to hold a very high place as one of the best early progenitors of the Thoroughbred horse—viz., the Stradling Turk, who, having been purchased from the Duke by Mr. Lister, a gentleman resident in Lincolnshire, became, under the name of the Lister Turk, a famous stallion in that county, where he begat Snake, Coneyskins, Piping Peg, and the dam of the Bolton Sweepstakes.

These were all celebrated horses from whom the blood of the Lister Turk has come down to the horses of the present day; and as no fewer than five strains of this famous Turk were to be found in Eclipse, it would make a rather long sum in addition to tell how many strains of the blood of this Buda warrior are to be found, say, in Mr. Jinks's pedigree chart.

This fact surely tells us that the whole credit of the fine horses now comprising the British breed must not be given to the Darley Arabian, the Godolphin Arabian, or the Byerly Turk, an idea entertained by many who have only curtly glanced through the pages of the Stud Book.

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*From the "Live Stock Journal" (England).

James's successor, William of Orange, had but little time from his wars to give to either breeding or racing, and yet two very notable horses of Eastern blood were brought into England in his reign—viz., the Byerly Turk and the Black Barb Chilaby. The former, like the Lister Turk, was another "warrior," called after his owner, Captain Byerly, whose charger he was at the battle of the Boyne, which sealed the fate of the Stuart dynasty; and Chilaby was imported by King William himself, as was also the Barb mare Slugey, in foal to him with Greyhound, who, although foaled in England, was a full-bred Barb.

The blood of the Byerly Turk comes down to our time chiefly through his sons Basto and Jigg, sire of Partner, and through the latter's grandson Herod; while the blood of Greyhound, although he got several fleet runners, was subsequently known only through Lord Halifax's Sampson, whose dam was a Curwen Barb mare, and must not be confounded with Sampson, the son of Blaze, who was sire of Engineer and Bay Malton, who were the early progenitors of several of the great horses.

Yorkshire's Good Work.

It was early in the reign of Queen Anne (1702-1714) the arrival of the Darley Arabian in Yorkshire (where the Leeds Arabian had been located a year or two previously) occasioned extraordinary rivalry among the noble and wealthy families resident in the three Ridings for the possession of Eastern blood; and as this not only increased as time went on, but extended to other parts of the kingdom, a great improvement took place in our breed of horses. During the first three decades of that century a number of the following Eastern sires were brought into England, and located in different parts of the country, while the others were imported later, viz.:—

ARABIANS.—Alcock, Bethell, Basset, Bell's, Bloody Buttocks, Bloody-shouldered horse, Conyers, Chesterfield, Cullen, Coombe, Curwen's chestnut, Cyprus, Damascus, Devonshire, Darley, Fletcher, Godolphin, Gibson, Harpur, Hampton Court, Honeywood, Hill, Johnson's, Leeds, Lexington, Somerset, Sutton, Lonsdale, Lord Brook's, Sir W. Morgan's, Newcombe, Newton, Northumberland, Oglethorpe, Oxford Bloody-shouldered horse, Panton's, Portland, Pulleine, Richards, Stanyon, Sannach, Sedley, Wildrington, Thompson's Grey, Wilson's, Wilkinson, Woodstock, and Wynn.

BARBS.—Cole, Compton, Crapple, Croft's Bay, Curwen's Bay, Curwen's Gay Morocco, Hutton's Bay, Hutton's Grey, King William's Black, Lowther Bay, Lowther White-legged, Rider Chestnut, Rutland Black, Saint Victor, South, Tholouse, Taffolet, Vernon, and Wolseley.

TURKS.—Akaster, Belgrade, Brownlow, Budlington, Byerly, Crawford, Ely, Faulkner Grey, Sir E. Hale's, Holderness, Lambert, Lister, Newcastle, Orford, Stamford, Strickland, Selaby, Shaftesbury, Turk (sire of Flanderkin), Wastell, and Williamson.

OTHERS.—Duke of Rutland's Persian, Sir T. Gascoigne's foreign horse, and Sir Wm. Goring's foreign horse.

How they Mixed.

Every one of these Eastern sires "did the State some service," but the blood of the Darley Arabian, the Godolphin Arabian, the Leeds Arabian, the Oglethorpe Arabian, Curwen's Bay Barb, the St. Victor Barb, the Compton Barb, the Lowther Bay Barb, the Taffolet Barb, the Akaster Turk, the Byerly Turk, and the Lister Turk is to be found in greater quantities in the pedigrees of the present day than that of their compeers. Nevertheless, there is no room to doubt it was owing to the crossing and recrossing of the whole of the foregoing Eastern sires, and the thorough amalgamation of their blood, that has given to Great Britain the finest breed of light horses in the world, and the descendants of whom are now to be found distinguishing themselves on the racecourse in every part of the globe.

THE JOURNAL A GREAT HELP.

A Mount Fox farmer writes, 1st July, 1929:—"The Journal is a great help to us, as it contains the right information for the man on the farm. Ours is a mixed farm. I wish the Department every success."

RURAL LIFE IN OTHER LANDS—III.

By the EDITOR.*

We ended our last talk with some reference to the new levels of land utilisation in French agriculture during and immediately after the World War. We will now go on to consider some points in relation to size of farms, to type of farming, and later offer some more or less suggestive information on the possibilities of increasing our trade with France. Small properties have been the rule in France for centuries. The division of the land into very small holdings dates back to the enfranchisement of the country people some hundreds of years ago. It is a fairly common belief, or at least I have found it so, that the system of subdivision of farming lands into very small areas is a relic of the Napoleonic regime, but as a matter of fact, even under the feudal system, small holdings were farmed, and since that time the subdivision of land has continued. From time to time there has also been a counteracting movement, and great holdings such as Crown lands and the estates of the nobility have been consolidated.

Areas and Tenure of French Farms.

To some extent, even in Australia we see evidence of this sort of reaction, where land that was originally cut up into small areas has become gradually part and parcel of large estates under various forms of tenure.

At the time of the Revolution of 1790, there were about 4,000,000 landowners in France, of whom the greater proportion, perhaps 80 per cent., were small farmers who owned something like 40 per cent. of the land. After the Revolution large holdings were split up and divided among landless farm labourers and holders of small areas little larger than what we would call allotments. From then on the number of peasant proprietors continued to increase until about forty years ago the rural holdings ranged in area from less than an acre up to, in rare cases, some hundreds of acres, and averaging a little more than 10 acres each. A vast number of holdings were less than 25 acres in size.

To-day, it often happens that several of these small holdings belonging to one owner are scattered round in different localities in different directions at different distances from the villages in which a vast majority of farmers live. And that is a peculiarity of French rural life, and nowhere else in my knocking about have I seen such a development of this communal or community instinct. The village with its Mairie or Town Hall, its Church and its Chateau is in most Departments the centre of community life. The people live in the villages and go backwards and forwards to their farms. There is less of that individualism that is such a marked characteristic of British people and other races of Northern Europe. Implements, machinery, and even draught horses are often community-owned on a co-operative basis. All the same, nothing will part the French peasant from personal ownership of his land, no matter how small the area may be.

Pride of Ownership.

The great ambition of the rural worker in France, if he is not already a proprietor, is to own a bit of land. I also noticed this characteristic, this love of the land, very markedly evident in other European countries, and if their people are ever induced to migrate they carry this characteristic with them.

I remember once meeting a Swede, a new chum, in a country district in Queensland. He was slaving like a working bullock on double overtime on a bit of the hungriest, gravelly, ridgey, gum-topped box and spotted-gum country I have ever seen, and trying to make a farm out of it. Talking to him on his prospects, in his eyes one saw the pride of ownership, a pride that one was afterwards to see reflected even more brightly in the eyes of the small farmers of France and other Continental countries. He told me, and he was only a young man then, that when he left his homeland—Sweden—his one idea was to come to Australia where he might realise his life-long dream of owning ten acres, ten cows, and becoming a J.P. like his former employer in the old land. Out of the timber on his land he had hewn one of the neatest of slab houses—he was a sort of a Tommy Gorman with the broad axe—and all the fencing and other structures on his block were put into the ground to stand up and stay there.

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* In a Radio Lecturette through 4QG.

I ventured to suggest that on the country he had selected there was little likelihood of his ever achieving his very modest ambition. Many months later I met him again with all his belongings piled on a German wagon with a well-worn single furrowed plough and set of harrows in tow behind the outfit. Those and two poorly-conditioned horses comprised all his worldly belongings. He had been compelled to abandon his hungry holding.

''By yove, Yack,'' he told me, ''Ah baint beat yet, no by gum! Dot varm of mine—vot you call it?—vouldn't give bandicoot tucker mit. You remember dat oder varm, Yack, dad vas not von bit goot. De Devil he yump mit me and run mit me round der stomp. I chase him altogether alretty. But den I find dat all de time he chasin' me. Dot varm keep me poor and de Devil he keep me ver' mooch poorer, altogether yet so soon, but this time I vill yolly vell vin.''

It was a new district, and forfeiting the one selection he had drawn another—as sweet a bit of alluvial river flat, backed by a wall of vine scrub that would fire the fancy of any farmer—and had just arrived on the new block. Though late in the afternoon, he unyoked, watered and fed his horses, yoked them up again to the plough and started in on a small stretch of clean, open country and kept going turning over the furrows while daylight lasted. Fired with the pride of ownership he eventually made that farm one of the best in the whole of that rich district. He more than realised his ambition, and when I saw him last he was milking, not ten, but a hundred cows, was chairman of the local butter factory, chairman of the shire, and a J.P. His energy, his love for his land, and his pride in its ownership were typical of the hardworking peasant proprietors of Europe. Queensland could do with many more like him.

Love of the Land.

The small farmers in France cling like a bank to a security in the possession of their land. The characteristics and producing capacity of each tiny field are known and family traditions have been built up as to methods of cultivation and caring for these little patches of country, the boundaries of which are often marked only by small white corner stones, suggestive of surveyor's pegs, and one straight separating furrow.

Naturally in these older countries habits, customs, and practices change very slowly, and in a French village, especially on market days, one can easily imagine oneself back in the Middle Ages.

Changes in ownership are not very frequent as in a new country like Queensland. All the traditions of the countryside are rooted in the soil, and holdings remain in the one family for generations.

Changes in Ownership.

It has been said that the subdivision of farming country became more frequent during the war, but it is probable that these reported changes were more ''on paper'' than real. Many cash-and-share renters had purchased, it was said, the lands they had previously cultivated because, in general, the price for agricultural products had increased more rapidly than had land values. But it is more probable that large holdings were purchased by merchants and manufacturers who had made large profits during the war than that these properties passed into the hands of peasants. The depreciation of the franc also rendered it possible for foreigners to acquire land more easily than natives of the same class, and a very considerable number of immigrants from other countries have settled on the soil of France.

There has been no sudden change in the system of land tenure comparable with the splitting up of the large estates of Russia and Roumania, and if more land has passed into the hands of the peasants since the war the movement has been a continuance of the tendency that has been in operation for more than a century.

France is a land of small farms well tilled. This fact goes a long way towards explaining how a country about one-fourteenth of the size of Australia is able to grow enough food to supply nearly all the requirements of a population nearly eight times as great.

France's Food Supplies.

And talking of food supplies, before the war France was practically self-sufficing with regard to meat supplies. It is estimated that foreign sources furnished but 2 per cent. of the total consumption. There was a deficiency in pork and pork products and in mutton. The latter was largely made up by the importation of sheep from the French colony of Algeria. There was an exportable surplus of beef and cattle. During the war the import duties were removed and very large quantities of meat, especially beef, were imported by the Government for the army. After the war, as was to be expected, these large shipments declined. Some years later, however, the trend of imports took an upward turn and the quantities imported since have been steadily increasing. Through the necessity of eating imported frozen meat during the war, many people lost their prejudice against it and now continue to consume large quantities of this class of food.

Workers are now so much better paid relatively that they can afford a much greater proportion of meat in their diet. This increased use of frozen meats is in common with an increased consumption of such meats in western European countries. Before the war England took more than four-fifths of the world's chilled and frozen meat exports. With the continental markets becoming more important, the proportion of this type of meat taken by England was reduced to only two-thirds of the world's exports, the remainder being absorbed largely by continental European markets. France, since 1914, has usually been the most important continental importer of such meats, a fact of which possibly we in Australia might take more notice.

Possibilities of Business for Australia.

Coming to general conclusions from our very sketchy study of rural economic conditions in France, one has naturally had an idea of suggesting the possibilities of France as a market for Australia.

The tremendous losses of man power, the destruction of property, and the devastation of the soil itself have taxed the recuperative powers of France to the utmost. Yet during the interval of the comparatively few years since the armistice France has, unaided, practically completed the restoration of the ten devastated Departments. Hundreds of thousands of farms and dwellings have been re-equipped, and since 1923 industrial and commercial activity have given steady employment to all available labourers, and hundreds of thousands of workers have been recruited from neighbouring countries.

Employment at good wages has rendered possible the establishment of a higher standard of living in urban and industrial centres than has ever been before enjoyed among the masses of the French people. More wheat and more meat are in demand as well as better clothing and more luxuries. This fact is of great interest to the farmers of Australia, as is also the fact that more cereals are being consumed on farms, thus keeping from the markets certain supplies of food that now must be imported from abroad.

Before the World War agriculture was steadily losing its position of predominance in the national economic life of France. Field-crop production had been on the decline more than two decades and the country lands had been slowly going to grass. Live stock numbers had not increased proportionately to the greater available home-grown and imported forage and fodder supplies, but the live weights and quality of animals and the yield of milk had increased. The sale of live stock and animal products formed more than 70 per cent. of the farmer's income. France was practically independent of outside sources of meat supply, and had become an exporter of dairy products.

This situation was reached, as I have said in a previous talk, as the result of a series of adjustments to changes that had occurred in world agriculture. The world market became flooded with American cotton, and Australian wool, and the French farmer abandoned flax, hemp, and wool production and turned his attention to meat. Now the world market is being flooded with frozen meat, and the farmers of France are turning more and more to dairying.

The per capita consumption of meat, butter, milk, and wheat is increasing. France cannot meet the demand for increased supplies of animal products without abandoning still further the area under grain which, under the wasteful system of scattered land holdings, cannot be economically produced in competition with the broad acres and power farming of the newer countries like Australia. The possibilities of the French market, for our frozen and canned products particularly, is, in my opinion, well worthy of our attention.

CARE OF THE CAR.

THE WEEKLY OVERHAUL.*

Once having purchased the new car and got it safely home, the question naturally arises: How much care and attention is necessary when the vehicle is in frequent use, and what are the most important jobs which should be done, say, once a week, in order to maintain its efficiency? Various owners have various systems, but all no doubt agree that the most important jobs are those which centre in lubrication.

Follow the Oiling Chart.

It cannot be urged too strongly that the oiling chart which is issued, or should be issued, with every instruction book is one of the most important documents which comes into the hands of the new owner-driver, and he should study it until he is familiar with every point on the car which needs attention. He should also know how often each one requires it.

To carry out the programme which is here suggested, at least two hours will be required, but as such tasks should devolve into labours of love they should not be looked upon as waste of time, and often the stipulated period is exceeded in the enthusiasm of the moment, which is all to the good.

The Engine.

The first consideration should be the engine, and of prime importance is the level of the oil in the sump. It is preferable to ascertain this level after the engine has been running for a few minutes, rather than to withdraw the dipper rod when the oil is quite cold. In any case, it is not sufficient merely to withdraw the dipper rod, as the reading thus obtained may be erroneous owing to the influence of capillary attraction, which causes the oil level to show slightly higher on the rod than it actually is in the crankcase. The correct procedure is to wipe the rod quite clean and then take the reading.

On no account should the gauze filter be removed when adding fresh oil. On a cold morning it may mean that the lubricant will take some time to pass through the filter, but patience must be exercised, as it is essential that all impurities should be separated and trapped before the liquid enters the sump.

It is a mistake to oil a magneto or dynamo once a week. Actually these instruments require very little lubrication, and at fairly long intervals, but there is no harm in applying the spout of the oilcan to such parts as the throttle controls and advance and retard mechanism. It is a good plan also to inject oil on to the starting handle shaft bearing as the ingress or dust or dirt at this point frequently accounts for what is regarded as a stiff engine.

Whilst the engine is still exposed, the operator should make sure that the high-tension lead terminals, both on the magneto and plugs, are quite secure, and he should also examine the joint made by each plug with the cylinder head in order to make sure that there is no leakage which is leading to a loss of compression.

Should there be signs of partly burnt oil or oil bubbles round the joint, the plug must be tightened up slightly. Before replacing the engine bonnet make sure that the earth lead from the magneto is quite clear of metal parts, and especially those which warm up when the engine is running.

The writer invariably turns his attention next to steering connections. Even the shortest run over wet roads demonstrates the fact that these parts receive far more than their fair share of mud and water which is thrown up by the front wheels, and the object of lubricating the yoke ends and pivot pins weekly should be not only to provide the essential film of grease, but to force out grit and water which may be working their way in.

The Front Axle.

Although it entails slightly more trouble, it is an excellent plan to jack up the front axle before commencing operations, so that both road wheels are clear of the ground. Each wheel in turn can be spun round so as to make sure that it is running freely, whilst there is the additional benefit that the loads on the steering pivot pins will be reversed, permitting lubricant to ooze freely over surfaces which normally are tightly pressed together.

During the weekly overhauls, which take place within the first few months of the life of a car, it is desirable to force through each bearing at least one complete greaser-full of lubricant, and if an assistant can be obtained he will lightly swing the steering wheel from one side to the other, whilst the first operator screws down each

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*In the "Farmer and Settler."

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Mr. Murray-Gibbes.

Mr. MURRAY-GIBBES, the well-known Composer, writes :—"I am more than delighted with the speedy way Heenzo soothed my throat, eased the chest, and banished a very heavy cold that had troubled me for some weeks. Now I am never without a supply of Heenzo in my medicine chest."

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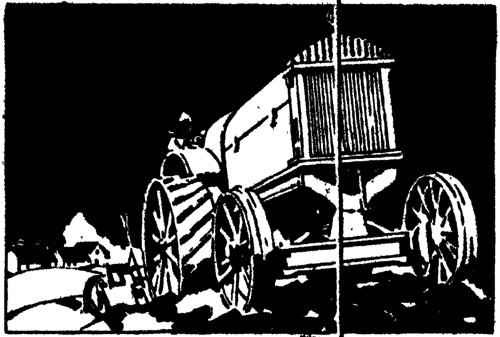

WORK

IN EVERY DROP

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greaser in turn. In this way the free circulation of the grease will be facilitated. Needless to say, if it has been decided to wash down the car, this should be done before the greasing is started.

The front axle should now be lowered again, and a choice of two methods of examining and lubricating the transmission presents itself. There is really only one main point which requires grease once a week, this being the clutch withdrawal mechanism, and the writer has found that it is almost as simple, and far quicker, to lie at full length under the car to do the job rather than to remove the floorboards.

Before passing to the rear of the car, it is a good plan to oil the change-speed gate, but, again, if unit construction with central control is adopted, the gearbox will look after itself. When the final drive is by an enclosed propeller shaft, the tubular casing taking the torque, the layout will require no attention, but if the shaft is of the open type, a triangular or other form of torque member being fitted, its anchorage to the chassis at the forward end may, and probably will, require periodical lubrication.

The Back Axle.

In so far as the back axle is concerned, the main points which must be watched are the brake-cam spindles. As a general rule, screw-down greasers are provided, but these very soon become coated with mud and are liable to be overlooked. Usually they are in a rather inaccessible position, but this should make the owner-driver all the more careful to see that they receive their proper quota of grease.

THE FARM TRACTOR.

BATTERY OPERATIONS.

By E. T. BROWN.*

It is commonly thought that the object of a battery is to store electricity. This is only true to a certain extent. The electrical energy that is passed into it when it is charged is converted into chemical energy. Chemical energy is reconverted into electrical energy when the current is tapped—that is, when it is being discharged. The active materials in this type of battery are lead oxide and spongy lead. The former is on the positive plates; the latter on the negative plates. These materials are held in suitable grids and immersed in a solution of pure sulphuric acid and distilled water. This acid solution, termed the electrolyte, consists normally of one part of acid to three or four parts of water. The plate grids are made with lugs to which the terminals are attached. The plates are contained in a sealed vessel.

The action that takes place can best be described by starting with a fully charged cell or battery. When current is taken therefrom a chemical action takes place. Some of the lead oxide on the positive plates and some of the spongy lead on the negative plates is converted into lead sulphate. This conversion causes water to be formed; hence the electrolyte in a discharged battery always has a lower density than that in a fully charged accumulator. During the discharge period only a small quantity of the lead oxide and the spongy lead is affected—that is, only a small proportion of the total quantity of the active materials present is involved in the change. When the battery is being charged, either from the dynamo in the case of a motor-car electric lighting and starting set, or from an outside source in the case of a battery used for driving the vehicle, the current is sent through in the reverse direction—namely, from the positive to the negative plates. The lead sulphate that was formed during the discharge is converted into lead oxide on the positive plates and into spongy lead on the negative ones. The density of the acid solution rises, since charging implies that the water formed during discharging is again converted into sulphuric acid.

Charging the Lighting Battery.

When a farm tractor is fitted with an electric lighting set a dynamo is also installed. This form of electric generator is situated on a convenient part of the engine, and driven by a belt or chain from the valve and ignition gearing. The dynamo need not be described at this stage, but it may be mentioned that a device known as a cut out is incorporated, this breaking the circuit from the dynamo to the battery until such time as the current generated by the former possesses a higher voltage than the current stored in the battery. Were this device not employed the battery would discharge itself into the dynamo. The dynamo should be switched on to charge the tractor battery for an hour every day the machine is in use and at all times when the lamps are illuminated. This generally serves to keep the battery fully charged, unless the outfit be used solely at night, when occasionally the battery may have to be charged from an outside source.

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*In the "Farmer and Settler."

Photo.: Dept. of Public Instruction.]

PLATE 71.—TRAVELLING MANUAL TRAINING SCHOOL—LEATHERWORK CLASS.

In Queensland, wherever possible, technical education is brought within reach of the country lad. This is an interior of a " School on Wheels." The wide service of the scheme can be appreciated when it is remembered that Queensland, with a population of fewer than a million people, has nearly 6,000 miles of railway.

Photo.: Dep'. of Public Instruction.]

Plate 72.—Leatherwork Class at a Rural School.

In the centres of the more closely settled districts Rural Schools have been established in Queensland, and in these the mechanical aptitude of the young Queenslander is practically encouraged; and he learns the value of organised work as well as the elements of arts and crafts.

PIG FARMERS' SCHOOL AT GATTON.

ADDRESS BY THE PRESIDENT OF THE ROYAL NATIONAL ASSOCIATION.

SUBJOINED is a brief summary of an address delivered by Mr. Ernest Baynes, President of the Royal National Agricultural and Industrial Association of Queensland, to members of the 1929 School of Instruction for Pig Farmers at the Queensland Agricultural High School and College, Gatton, and which contains many points of interest. Mr. Baynes returned recently from a tour to South Africa and New Zealand, and the student farmers were given the benefit of his close observations of agricultural conditions and practice in those countries. His address was greatly appreciated. Summaries of other interesting lectures delivered at the same school will appear in the September issue.

The Royal National Association.

The Royal National Association is intensely interested in the work of Queensland pig raisers who are establishing high standards in their important industry. The schedule of the Brisbane Show has set out the practical way in which the Association is assisting the pig breeders of the State, and much more is being done than that schedule indicates. New and commodious pavilions have been erected for housing this year's exhibits, and all necessary conveniences had been provided. In addition, sound educational work is being carried on in co-operation with the Department of Agriculture and Stock and the Agricultural College in the course of the year. The value of this activity may be appraised by studying the pork products section of this year's display in the Live Stock and Meat Industry Hall at the Brisbane Exhibition, which will provide a striking object lesson of the value of eliminating all waste and the utilisation of every by-product.

PLATE 73.—THE 1929 PIG SCHOOL AT GATTON COLLEGE.

A yard lecture by Mr. A. J. Mackenzie, Instructor in Animal Husbandry, discussing the merits of various types of Berkshires used in the College Stud for stud-breeding purposes.

The Country's Gift to the Nation.

Usually country people look to cities to supply the great citizens, thinking they are the product of the great Public Schools and Universities, but they are far from right. The great doers of Britain came from small towns and villages; Cromwell came from Huntingdon, Darwin from Shrewsbury, Nelson from a village; so did Cecil Rhodes, Hastings, and Clive. That fact was mentioned to show that residents of the country are not out of things.

Our idea of a good citizen is one whose life has made others wealthier, nobler, kindlier and happier—one who has in some way raised the standard of quality of human life; who has assisted the human race and raised human values.

Cecil Rhodes's idea of a scholar was a manly, efficient, and athletic man, a man cut out to be a leader of men, and with courage to take up national affairs.

In South Africa last year, the lecturer found evidences of Rhodes's great citizenship wherever he went. He was far from a saint, but yet a great man who understood mankind, he saw that this was the young man's age and hoped and wished them to take their place—hence the Rhodes scholars.

On the young men of to-day rests the future of this great Commonwealth, and if they did not want to be left behind in the world's competition they must strain every nerve to become efficient; and remember—nothing but the best is good enough.

The Best is only Good Enough for Australia.

A few years ago, when opening the Townsville Show, the lecturer had stressed the necessity of the young men of this country eliminating from their vocabulary the words "good enough," and, co-incidentally, about a month after, the then Governor-General, Lord Forster, when opening the Brisbane Show, made the same remarks. No doubt, he also had noted a tendency among Australians to let things rip. There is no such thing as good enough, and if we wish and hope to retain a place in the world's markets we must remember nothing but the best is good enough for Australia and Australians. The slap dash idea or good enough is rather tempting, for it means travelling along the lines of least resistance, but that is only a slippery track for weaklings. The farmers of the countries of the old world, who have not the good fortune to be in such an easy country in which to live as Australia, have made the standard of their products very high. As an example, the Danes set the standard for butter on the highest level, and when that level was threatened by New Zealand and Australia they set about improving their methods. There was no "good enough" for them. Boiled down, the best simply means efficiency, and it does not matter whether it is butter, bacon, flour, or meat; nothing but the best will do.

Conditions in South Africa.

In South Africa, the lecturer observed, the Freisian cattle are the most popular, and by concentrating on the breed the dairymen there had raised it to a very high level, and were actually sending large drafts of pedigree stock to England and the Continent, and making it pay. Country life there is far harder; for every one pest we have, they have ten, and they get droughts also. Africa is not as good as it looks, while Australia is better than it looks. But it has one great advantage over Australia—Capetown is only seventeen days from London; but in spite of that advantage farmers in South Africa, speaking generally, have a very poor time, and if it were not for coloured labour could not live.

After being in South Africa and studying conditions there, the lecturer said he is more convinced than ever that the ideal of a White Australia is the right one.

In South Africa the Government spent large sums of money on agricultural and pastoral education, and has a number of excellent agricultural colleges well equipped for research work—which is most necessary when one considers all their animal and plant pests. Africa is fortunate in having a great number of rich public-spirited men; men though they may live abroad do not forget what they owe to South Africa and richly endow all sorts of institutions.

"Cheque Book Farmers."

The lecturer met some of these men, they are called "cheque book farmers," who maintain valuable studs of horses, cattle, and sheep; men who import high price stock, irrespective of cost, and distribute the progeny at very moderate prices. These men do a great national service.

The improvement of their beef cattle is a very difficult matter, for the natives—Zulus and other powerful tribes—are big cattle owners who do not care about quality, numbers are what they want.

New Zealand's High Standards.

In New Zealand he found a very different country—a most highly cultivated one—a country of intensive cultivation where every acre on the farm is made to pay. It would be difficult to say what they carry per acre, but they have got the price of land too high, and as the holdings are small the sons of the owners are looking to Queensland; and with a little useful advertising we would get quite a number of young farmers with some capital to settle in Queensland. We do not want any more people in the towns, the country is calling for them.

The lecturer said that he did not know any country where there is a finer public spirit than in New Zealand. Go where you will you will find parks and institutions, all either dedicated to the public, or richly endowed by wealthy men who have done well out of the country. They, too, have some excellent State farms, but strangely enough no Agricultural High Schools similar to the one at Gatton.

Concluding, the lecturer said that he believed the greatest message he could leave with his hearers was that they return to their farms with a strong intention of doing bigger and better work in the pig-raising business, and while they had to look to their own livelihood let them remember the great national value of the work in which they were engaged. Let them do that work thoroughly and in accordance with the high ideals with which any great national service is inspired and guided.

PLATE 74.

THE OLDEST AND THE YOUNGEST STUDENT AT THE 1929 PIG FARMERS' SCHOOL OF INSTRUCTION AT GATTON.

Mr. E. Hill, of Beaudesert, and Master Arthur Mills, Gilston School Pig Club, Nanango.

PLATE 75.—THE 1929 PIG FARMERS' SCHOOL OF INSTRUCTION.

Farmers, Students, and Officials on a visit to the Metropolitan Bacon Factories as guests of the Queensland Bacon Curers' Association.

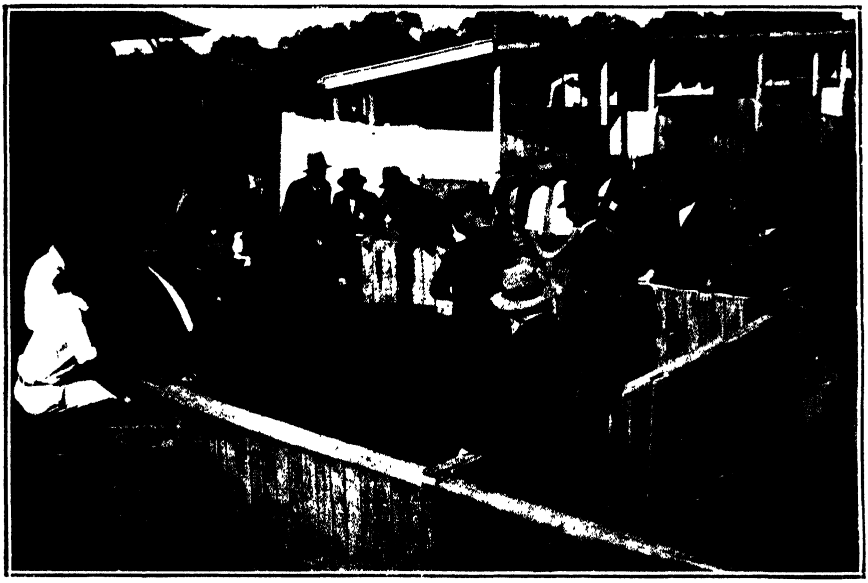

PLATE 76.—A YARD LECTURE AT THE PIG FARMERS' SCHOOL, GATTON COLLEGE, JUNE, 1928.

The Instructor in Pig Raising (Mr. Shelton) is discussing the merits of the Duroc-Jersey sow, used at the College in crossbreeding experiments.

PLATE 77.—WORK IS THEIR HOBBY.

The Staff at the Piggery at Gatton College who assisted in arranging the several demonstrations and whose services were available throughout the School term. On the right is Mr. H. Severns, the venerable "Pig Man," who has looked after the College Piggery for many years and has worked under several Principals.

OBITUARY.

THE LATE COMTE GONTRAN DE TOURNOUER.

The death occurred in St. Martin's Hospital on the night of 13th July of Comte Gontran Louis de Tournouer, B. Litt. (Sorb. Paris), Chevalier of Agricultural Merit, Officer d'Academie, and Librarian of the Department of Agriculture and Stock.

Although he was a notable Frenchman, coming from one of the oldest noble families of Brittany, the late Comte de Tournouer also qualified both in his service with the Australian Imperial Force in the Great War and in his private life in Queensland to the title of a good Australian.

Primarily interested in agriculture he possessed great literary attainments and his ability as a linguist—he could speak fluently every European language as well as Arabic—aided him greatly both in military and civil life. His father and two of his brothers fell fighting for France, each winning high distinction on the battlefield.

Comte de Tournouer was born at Pontivy, Brittany, on 27th August 1885. He was educated in Paris and graduated in literature at the Sorbonne University. He was about to enter St. Cyr Military Academy when the fortunes of his family suddenly changed and he came to Australia to start life afresh. Going on the land he became engaged in sugar growing and pastoral pursuits in the Wide Bay district. Later, he joined the Commonwealth Public Service, afterwards transferring to the State Service. He was on the staff of the Government Savings Bank when war broke out in 1914. He enlisted in the Australian Imperial Force for active service overseas on 17th August of that year. He embarked with the Australian Light Horse and saw service with that formation and the Camel Corps on the Eastern fronts; and transferred later to the Fourth Australian Divisional Artillery, and with that unit he was able to return to his native land as a Digger fighting in its defence. Invalided back to Queensland after meritorious field service he was appointed to the Military Censor Staff in Brisbane. After the Armistice he returned to the State Savings Bank and on the merging of some of the activities of that institution with those of the Commonwealth Bank he remained with the Advances to Settlers Board, and in October, 1922, was transferred to the Department of Agriculture and Stock.

In recognition of his services to General Pau's Australian Mission and other useful offices he was awarded by the French Government the honour of Chevalier of Agricultural Merit and Officier d'Academie. Sometime president of the Alliance Francaise in Brisbane, he was afterwards its vice-patron.

He was an able contributor to French and other periodicals on Australian life and agricultural and kindred subjects. On the lighter side of journalism he supplied much prose and verse, and occasionally topical cartoons, to the daily and weekly press, including the Sydney "Bulletin." He was endowed with a nimble and versatile pen—the ever busy tool of a gift of ready expression, of racy anecdote, of whimsical and often piquant humour and other attributes of a well stored mind. This happy combination

Plate 78.

The Late Comte Gontran de Tournouer, B. Litt (Sorb.), Chev. Merito Agric., O.A.

of gifts was unusual, but his learning always sat lightly upon him. With equal zest he browsed in the past and in the present; his mind flitted from antiquity to ultra modernity, and he was ever ready to enter the lists of current and ephemeral controversy. Ethnology was one of his hobbies.

As a lightning sketch artist he was always in demand at gatherings of ex-A.I.F. men. A member of the Returned Sailors and Soldiers' Imperial League of Australia he rendered much unobtrusive service to old comrades—sometime of "the toughest veterans in Normandy," who were crocked in the war and to whom he was bound by a common link of suffering and whose lives he sought to brighten and lighten. In this service he forgot his own great physical disabilities—painful legacies of hard campaigning which hastened his own untimely and intensely regretted end. In his last illness he exhibited remarkable cheerfulness, fortitude, and courage. A widow and small daughter survive him, and to them deep sympathy is extended

At St. John's Cathedral, on Monday, 15th July, a brief and most impressive service was held at which an old friend, the Rev. D. Morgan Jones, officiated and paid a touching tribute to the late Count's character, his gifts of mind and personal charm. The Union Jack and Tricolor draped the casket and on it rested a wreath of poppies.

That morning the late Comte de Tournouer was laid to rest in our own war cemetery at Toowong where the shadow of the Cross of Sacrifice falls athwart the Stone of Remembrance and as evening deepens extends across the Diggers' graves.

> "He sleeps as in his dug-out yesternight,
> With an old friend in reach on either hand;
> God has the jewel, the courteous soul of him;
> The dust that cased it lies till wars are done."

The Rev. Mr. Morgan Jones read the simple and beautiful burial service, and the sorrowing gathering at the graveside included Major H. R. Carter (Consular Agent for France), Messrs. E. Griffith Oxley (president), F. O'Sullivan (secretary), Leon Burguez, R. Beardmore, H. Tardent, Mrs. Campbell Brown, Madame Rochat, and Madame Tardent, representing the Alliance Francaise; Messrs. W. C. Warne (secretary) and W. C. Thompson (vice-president), representing the Limbless Soldiers' Association; Major H. Maddock and Mr. A. Rees, representing the Brisbane sub-branch of the Returned Sailors and Soldiers' Imperial League of Australia; Mr. J. H. Holliday (secretary), representing the State Branch of the R.S.S.I.L.A.; Messrs. R. Wilson (Assistant Under Secretary), G. Williams, H. Collard, and H. G. Crofts (Fruit Branch), H. C. Quodling, A. E. Gibson, C. S. Clydesdale, H. S. Hunter, and S. Burchill (Agricultural Branch), Lieut. J. F. Reid (Editor of Publications), Messrs. R. Veitch and J. A. Weddell (Entomological Branch), R. W. Peters (Cotton Section), G. R. Patten (Agricultural Chemist's Branch), R. B. Morwood (Plant Pathological Branch), H. S. Iliff and A. McGown (Stock Branch), M. L. Cameron (Dairy Branch), R. J. Holdsworth (Seeds Branch), A. A. Salmon (Accounts Branch), J. P. Orr (Registrar of Co-operative Associations), and J. Black (Commercial Section), representing the Department of Agriculture and Stock; Colonel Ray Stanley (Government Analyst's Branch), Dr. J. V. Duhig, Mr. T. C. Troedson and Dr. E. A. von Schulze (representing the Intelligence and Tourist Bureau); Mr. Arthur Avins and Lieut. G. Zucksweerdt.

Answers to Correspondents.

To Soften Greenhide.

J.E.H. (Mapleton)—

After dehairing the calf skins in a solution of lime water, as you have already done, soak them thoroughly in kerosene, and afterwards apply vigorously any form of grease, provided it does not contain any salt.

Stomach Worms in Sheep.

P.K.C. (Dalby)—The Senior Instructor in Sheep and Wool (Mr. J. Carew) advises as follows:

Regarding stomach worms in sheep, from practical experience I have found the arsenic and Epsom salts very satisfactory, especially when changed every third or fourth drench to bluestone and mustard. Leaflets on both of these drenches have been posted. Besides these I found that through drenching the same flock of sheep year after year many sheep take more dosing to keep them healthy than others, consequently individual treatment suggested itself with the result that certain sheep (breeding ewes) were marked for identification, and these were selected owing to their condition not improving. With these I increased the dose, and in some cases I doubled the dose before getting satisfactory results, and I am convinced that the worse the sheep is from stomach worm infestation the more arsenic they will stand, and further, that it takes more to dispel the worms, for in heavily infested sheep they become anaemic, showing swellings under the jaws. They also get a craving for water and consequently the fourth stomach where the *Strongylus contortus* is located contains more liquid than is usually found in a healthy sheep.

The benefit of changing to the bluestone and mustard every third or fourth drench will be reflected in the sheep. Dr. Clunies Ross, who has been conducting experiments in Central Queensland with carbon tetrachloride, reports that the most effective treatment known at the present time for stomach worm infestation in Australia is the use of carbon tetrachloride, a drug which is also of great value in treating liver fluke infestation. He states that less effective than this is bluestone (copper sulphate), but this drug has the advantage that it is cheaper, easily administered, and very safe. The object of the medicinal treatment of sheep is not only to cure them of the effect of worm infestation, but secondly, and more important perhaps, to kill the worms in them so that they can no longer produce eggs to contaminate the pastures further. He further states in practice, however, this is not practicable under Australian conditions:—(i.) Because there is no drug known which can be guaranteed to kill every worm and (ii.) because in many instances it is impossible to drench all sheep every three or four weeks throughout the spring, summer, and autumn months. It is possible, however, to reduce losses from worms to a minimum and to convert what is unsound country because of worms into payable sheep country.

Treatment with carbon tetrachloride is given in the following doses:—

Lambs, 1 cubic centimetre or 17 drops;

Adult sheep, 2 cubic centimetres or 34 drops.

Owing to the small size of the dose the drug must be given in such a way that none of it is lost. It may be administered conveniently (*a*) in gelatine capsules of 1 cc. or 2 cc. size, or (*b*) mixed with four parts of liquid paraffin—making a dose of 5 cc. for lambs and 10 cc. for adult sheep.

Before treatment.—The sheep should be yarded overnight and dosed on the following morning before being allowed food and water. They may be allowed food as soon as they have been treated with this drug. When administering capsules it is best to use a small balling gun, which can readily be made by taking a piece of stiff rubber tubing approximately 9 in. in length, with an internal diameter of ½ in. A plunger of cane or wood should be smoothed down so that it runs easily in the barrel, and should be sufficiently long to form a handle on which a guard should be fixed to allow the plunger to be driven home to ⅛ in. from the end of tubing.

The operator stands in front of the sheep, the catcher opens the mouth by grasping both upper and lower jaws, the barrel is inserted and pushed backwards over the base of the tongue, and the plunger driven home to expel capsule.

Administering the liquid.—When the liquid is used it should be given by means of a metal syringe holding exactly 5 or 10 cc., according to whether lambs or adults are to be dosed, and fitted with a long slightly curved nozzle. The syringe is filled with the liquid, the nozzle inserted over the sheep's tongue, and the syringe emptied steadily. Owing to the fact that carbon tetrachloride evaporates quickly, only a small quantity at a time should be poured from the container into the vessel from which the liquid is filled. The ingredients for the copper sulphate drench are—Bluestone, 8 oz.; water, 3 gallons. Dose for adult sheep, 2 fluid oz.; for 2-tooths, 1½ fluid oz.; lambs, 6 to 12 months, 1 oz.; lambs, 3 to 6 months, ½ oz.—which is stronger than the dose recommended by this Department, minus mustard.

A plan of treatment that would last over the year is also given as follows:—

(i.) All sheep to be treated in July. The degree of infestation both in sheep and pasture is at its lowest at the end of winter, owing to the fact that cold is unfavourable to the development of eggs and young worms. If thorough treatment of all sheep is carried out at this time the great majority of all worms will be killed, so that on the event of the warmer weather in the spring, when development becomes more rapid, few eggs will be passing out on the pasture.

(ii.) All young sheep and lambing ewes and if possible all sheep to be treated in September. Treatment at this time will again decrease the output of eggs.

(iii.) Treatment of young sheep and lambing ewes must be repeated at monthly intervals from November to May.

(iv.) All aged sheep other than ewes in lamb should receive at least two drenchings during the worst summer months. Though all aged sheep receive at least two treatments in January and March it is preferable, where only small numbers of sheep are to be drenched, for all sheep irrespective of age to be given the monthly drenchings from November to April.

Preventive Measures.—(i.) Burning-off paddocks. (ii.) Protection of young sheep. (iii.) Heavy stocking to be avoided. (iv.) The use of licks.

In conclusion, Dr. C. Ross wishes to urge the necessity for sustained action in any effort to control worm infestation. He writes it is by no means an easy problem, and there is no sovereign remedy which is both very cheap, easy to apply and thoroughly effective. Stockowners must realise that the solution of this problem will depend on the thorough application of not only one but all the measures outlined, but they may be assured that success will more than repay all the money and energy expended. In connection with licks, there are many on the market which are registered and carry the maker's guarantee.

FRUIT GROWING.

Winter Watering of Apricots.

H.G.H. (Wondecla)—

The Director of Fruit Culture (Mr. Geo. Williams) advises that there is no occasion to water apricots during the winter months. Light watering just before they come into growth would assist in stimulating the tree generally, and a further supply after the fruit has set would also be beneficial. The hidebound condition of bark suggests that the position is uncongenial, and a dressing of complete fertiliser prior to spring growth is recommended.

BOTANY.

(*Replies selected from the outgoing mail of the Government Botanist, Mr. C. T. White, F.L.S.*)

Panicum gracile.

J.L.W. (Chinchilla)—

Your specimen of grass is *Panicum gracile*, fairly common in Queensland and New South Wales, and ranging from the coast to the interior. It grows in a variety of situations, and in better class soil in the West is fairly drought-resistant. It is relished by stock, and has a fairly high nutritive value. Most of the native Panick grasses are very useful in the general mixed pasture. We have not heard of a common name applied to it, but it has been referred to in several works on Australian grasses as the "Slender Panick Grass."

"Crane Bill" or "Native Carrot"; "Potato Bush."

E.J.T. (Charleville)—

The small plant with hairy leaves is a young growth of some plant of Geraniaceæ, I think *Erodium cygnorum*, the "Crane Bill," generally regarded as a good fodder, and known in Western Queensland as Geranium or "Native Carrot." The latter name is, however, applied to quite a number of different plants.

The other plant with berries is *Solanum Sturtianum*, a species of "Potato Bush," fairly common in parts of Western Queensland and New South Wales. In the latter State, feeding experiments have proved the plant to be poisonous. The symptoms, as outlined by the investigators (Dr. H. R. Seddon and Mr. H. R. Carne), have been described as follows:—

1. The eating of the berries by stock leads to a fatal hæmorragic inflammation of the stomach and intestines.

2. Symptoms of illness are not manifested for a day or more after taking the parts and the first notice is that the animal becomes markedly depressed. Soon violent diarrhoea ensues and this leads to a marked weakness and wasting. Death usually occurs in from two to three days, though animals may linger longer. Other symptoms noticed were frothing at the mouth and slow breathing.

3. On post-mortem examination a most marked change was seen in the stomach and intestines. In this the lining membrane is dark red, and may be soft and tarry-looking. Blood and mucus are mixed with the bowel contents.

Tie Bush.

A.W.A. (Gympie)—

Your specimen is *Wickstroemia indica*, the "Tie Bush." The local name is applied on account of the fibrous nature of the bark. It has been suspected of poisoning stock on several occasions, but feeding experiments with it, conducted at the Stock Experiment Station, Yeerongpilly, some few years ago, show it to have very little ill effect on cattle. It is very hard to get cattle to eat it, and after about a fortnight's feeding, the animals become very emaciated, weak, and rather constipated, but no other ill effects follow, and it is doubtful if paddock stock would eat sufficient of the plant to cause trouble.

Asthma Weed—Rosemary.

M.C. (Lota)—

The Asthma Weed (*Euphorbia pilulifera*), is very common at certain times of the year in the neighbourhood of Brisbane, particularly favouring edges of cultivation paddocks, and the ballast along railway lines. In fact, in a walk along any railway line in the neighbourhood of Brisbane during the summer months, you will see plenty of Asthma Weed, which is a reddish plant covered for the most part with small hairs, and exudes milky juice when cut or broken.

Rosemary does not grow wild in Queensland, though it may be seen in gardens. If you cannot get it from the local nurserymen I might mention that plants are sold in some of the Southern States, for instance by Messrs. Hazelwood Brothers, Epping, New South Wales, at 1s. 6d. each.

Plants Identified.

T.H.B. (East Barron, via Atherton)—Your specimens are:—

1. *Sida cordifolia*, the Flannel Weed, of Family Malvaceae, a common weed widely spread over the tropical regions of the world and very common in North Queensland.
2. *Ageratum conyzoides*, a native of Mexico and tropical America, very common as a weed in most tropical countries. It was introduced into Australia as a garden plant, and as a matter of fact is still planted extensively in the Southern States as a bedding plant, the cultivated forms however being somewhat more compact than the wild one. In Queensland it is most familiarly known as "Billy Goat Weed."
3. *Cenchrus australis*, Hillside Burr Grass, or Scrub Burr Grass, a native grass commonly known in Queensland by the absurd name of "Scotchmen's Lice."
4. *Antigonon leptopus*, a native of Mexico and Southern America, and commonly known abroad as "Mountain Rose" or "Loves Chain"; in Queensland, however, it is known by its botanical name. It belongs to the family Polygonaceæ.
5. *Angelonia sp.*, family Scrophulariaceae. We have had this plant in the Botanic Gardens, Brisbane, for some years, and it has always gone under the name of *Angelonia floribunda*, a native of Mexico, but we are not absolutely sure of the specific name being correct.

Central Western Plants Identified.

A.M.McL. (Springsure)—Your specimens are:—

D.D. *Eremophila maculata*, Fuchsia Bush, family *Myoporaceae.*

E.E. *Myoporum deserti*, Ellangowan Poison Bush, family *Myoporaceae.*

F.F. *Gnaphalium luteo-album*, Cudweed, family *Compositae.*

G.G. *Abutilon sp.*, family *Malvaceae.* Specimen too small for specific determination.

H.H. *Acacia excelsa*, Ironwood Wattle, family *Leguminosae.*

I.I. *Loranthus exocarpi*, a species of Mistletoe, family *Loranthaceae.*

J.J. *Petalostigma quadriloculare*, Quinine Berry, family *Euphorbiaceae.*

K.K. *Alphitonia excelsa*, Red Ash, family *Rhamnaceae.* Generally regarded as a very useful fodder tree.

L.L. *Solanum sp.* A species of Potato Bush, family *Solanaceae.* Members of comparatively large genera such as Solanum and Abutilon, in which many of the species are alike and not clearly defined, are often impossible to name specifically from small pieces.

Knotted Clover.

R.J.G. (Kinleymore, Preston Line)—

The plant is a species of Clover or Trefoil, but these plants are very hard to determine specifically before the flowering stage. We have spent some little time on your specimen however, and should say it is *Trifolium striatum*, the Knotted Clover, a native of Europe, naturalised in the Southern States, but not previously met with in Queensland, and we should say your plant was evidently introduced with Southern seed. The plant is of annual duration, but during the winter and early spring months gives a fair amount of nutritous fodder. If the plant flowers with you later, we should be glad of a specimen to verify the determination.

Black Mauritius Bean.

E.M.C. (Mackay)—

Your specimen is *Stizolobium aterrimum*, commonly known in Queensland as the "Black Mauritius Bean," and largely grown in some places as a green manure, particularly for cane. It is sometimes known in Queensland as the "Florida Velvet Bean," but the true "Velvet Bean" is a somewhat different plant. Though the "Black Mauritius Bean" is very widely cultivated in tropical countries, the beans seem never to be used for food. Allied species have been tried, but though the flavour was not unpleasant, they were found to cause purging and vomiting if eaten in ordinary quantities.

A Native Species of Passion Vine.

W.L. (Traveston, N.C. Line)—

Your specimen is *Passiflora Herbertiana*, a native species of Passion Vine. Both the leaves and fruits contain a prussic-acid-yielding glucoside, and if eaten in quantity would act on stock in much the same way as young sorghum and similar plants, death being very rapid.

Caustic Creeper.

INQUIRER (Brisbane)—

The specimens forwarded from Evesham Station, near Longreach, have been determined as follows:—The smaller leafed kind is the Caustic Creeper *Euphorbia Drummondii*, commonly known in Queensland by its botanical name. This plant is very widely spread in Australia, and reports about its poisonous properties are very conflicting. In New South Wales tests have found the plant to frequently contain a prussic-acid-yielding glucoside, the plant causing trouble in somewhat the same way as young Sorghum, death being very rapid. Numerous tests, however, have been made with the Queensland-grown plants of the same species, and the poisoning sometimes found was distinct from that of prussic-acid poisoning. In the more serious cases the most characteristic feature is stated to be a swelling which then exudes a clear amber-coloured liquid. The head and face then appear as if they had been badly burnt, but the sheep usually recover.

The other plant is another species of Euphorbia, namely *Euphorbia eremophila*, commonly known in Queensland as the "Bottle Tree Caustic." This plant is widely spread over the Australian States, going from Eastern Australia right over to Western Australia. Where it grows it is generally regarded as poisonous.

"Cunjeboi."

S.W. (Brisbane)—

The specimen forwarded with your letter of even date is *Alocasia macrorrhiza*, commonly known in Queensland as "Cunjeboi." This plant contains in its tissues a considerable number of rhaphoides of calcium oxalate. These are contained in small capsules, which become ruptured when the plant is chewed, with the consequence that they enter the tender parts of the mouth and cause intense pain. It belongs to the family Araceas, and this is a property that occurs more or less through the family. The roots, however, after cooking are quite edible, as for example in the well-known "Taro" and "Dasheen," both very closely allied to the "Cunjeboi."

Guinea Grass.

D.S.McN. (Nambour)—

The specimen forwarded by you is Guinea Grass, *Panicum maximum*. As the name implies, it is a native of Guinea in tropical Africa, but is now widely spread throughout all the tropical and subtropical regions of the world. It is a tall growing grass, forming large tufts of leafy forage, which makes a change from the common Paspalum and Rhodes grass. It is a drought-resistant grass and is adapted not only for feeding but also for chaffing and ensilage. Though the grass has been reported on favourably, it never seems to have taken on extensively. Along the North Coast line it is most abundantly seen as a weed in cultivation, particularly of orchards.

Paspalum platycaule—Carpet Grass.

R.M. (Mooloolah)—

Paspalum platycaule, or Carpet Grass, is a native of the warmer parts of America, but now widely spread over the tropical regions of the world. It is very common in North Queensland and less so in the south. It has rather a mixed reputation as a fodder, but seems to be a useful grass for growing in poorer soils than those in which the ordinary Paspalum will thrive. It is very similar to, and has been confused with the smaller grass, Paspalum or *Axonopus compressus*. This has somewhat narrow leaves, and is considered a better fodder. You could, perhaps, employ it for smothering out the *platycaule*.

Figs and Other Queensland Plants.

B.F.K. (Teneriffe, Brisbane)—

1. Is the name Brachychiton to be preferred to Sterculia? We think so. The only true Sterculia would then be *S. quadrifida*. If you are publishing notes on the timbers, however, we would advise you to use both names, giving one of them in brackets.

2. What is the distribution of *Erythrina vespertilio*. From the coast right to the far interior, travelling into Central Australia. It goes along the whole range of the coast at least as far north as Cooktown and then along to the Northern Territory.

3. What is the range of *Erythrina indica?* Mostly the islands of Torres Strait, and in coastal localities as far south as Bowen, growing practically on the sea beach. It has been recorded from Tallegalla by the late F. M. Bailey. This last is rather an isolated locality.

4. In what parts of Southern Queensland has *Embothrium Wickhami* or a variety of it been recorded? The normal form is confined to North Queensland, but a variety, *var. pinnata*, occurs on the mountain ranges of south-eastern Queensland, the only two localities we know being Lamington National Park, and Springbrook. The same variety grows on the Warrego in New South Wales.

5. The distribution of the six principal Figs? This is rather hard to give, but we should say the following are among the commonest Queensland Figs:—

Ficus macrophylla, the Moreton Bay Fig, mostly in the south, but in a few isolated localities as far north as Bowen.

F. Watkinsiana, almost the commonest fig in the rain-forests or scrubs of south-eastern Queensland. It is very common on the ranges in the South, on the Bunya Mountains, and at Kin Kin.

F. Cunninghamii, along the whole coast, trees attaining a very large size.

F. platypoda, common along the whole coastal country, often in the open forest.

F. pleurocarpa, common everywhere on the Atherton Tableland.

F. colossa, Northern Queensland. The big tree you see in so many photographs of Northern Queensland is supposed to represent this species.

F. glomerata, very common along the rivers from the Wide Bay district to the Gulf Country.

PIG RAISING.

(*Selected from the outward mail of the Senior Instructor in Pig Raising, Mr. E. J. Shelton, H.D.A.*)

The Best Bacon Pig.

W.J.S. (Inglewood)—

The question as to the most suitable breed of pig is largely a matter of personal opinion, for practically every breeder has his own fancy, and the bacon factories have not definitely stated which type they prefer.

A series of experiments are in progress at the Gatton College in which representative pigs of various breeds are being crossed for the production of pure and cross-bred pigs, the objective being the production of the most suitable type of bacon pig. Special features being emphasised in these experiments are, prolificacy, early maturity, suitability for market requirements and economy in production.

The Poland-China pig appears to be a very useful type for the production of pork and bacon pigs, particularly when it is crossed with a more lengthy breed like the Tamworth and similar types. We would not recommend the breeding of purebred Poland-Chinas for bacon production, for the reason that the crossbred pig appears to give better results. The same may be said with regard to the Duroc-Jersey, although no doubt it would be possible to produce a purebred animal in this breed suitable for market requirements.

The Berkshire has been a very popular type for many years, and during recent years the Tamworth crossed with the Berkshire has been a very popular one. The Berkshire-Yorkshire cross is also a particularly good one, particularly for the production of porkers or bacon pigs where the conditions are specially suitable, and there is no doubt that there are many advantages to be obtained in the use of the cross by using a Yorkshire boar.

Prices for stud pigs can be usually based on a valuation of approximately one guinea per month, starting at about four guineas at three months to approximately twelve guineas or so as yearlings.

Specially selected boars or extra good quality sows in-pig would, of course, be higher than inferior quality stock. We believe in better quality pigs, and strongly recommend breeders to secure the very best it is possible to obtain in the breeds in which they are interested.

IS THIS A JERSEY RECORD?

From the English Jersey Cattle Society, 19, Bloomsbury Square, London, W.C.1, come particulars referring to the cow Rosemary. Her last calf was born 25th April, 1926, and up to 25th April, 1929, she has given 23,670¾ lb. of milk, and was then still giving 10 lb. of milk per day. Her last butterfat test was—evening 6.2 per cent., morning 5.45 per cent.

Owned and bred by Mrs. H. E. Jerome, Pittern Hill House, Kineton, Warwickshire, she was born 1st July, 1914, and has had eleven calves, ten of which are heifers.

Her weight is only 8 cwt. 14 lb., so that in three years she has given more than twenty-six times her own weight in milk with the one calf, and still giving a gallon of milk a day.

The English Jersey Cattle Society asks if this is a record.

PHYSIOLOGY OF MILK PRODUCTION.

Recent research has thrown much light on the physiology of the act of milking, on which subject some varying theories were previously entertained. An American authority, writing in the "Guernsey Breeders' Journal," states that as soon as the milking act begins a small quantity of milk is removed from the cistern and larger ducts. There then follows a short period when only a small quantity of milk can be obtained. Soon there seems to be a great inflowing of milk into the udder. One says that the cow has "let down" her milk, or that the milk has "poured in." It is this reaction that has caused many to come to the conclusion that milk secretion goes on at a rapid rate during the act of milking.

In addition to the manipulation of the teats at the beginning of milking there are other types of stimuli which cause some animals to let down their milk. There is apparently considerable variation, and animals once becoming accustomed to certain types of stimuli react more quickly to that and sometimes will not respond to the ordinary causes. This factor undoubtedly is extremely important with large producing cows, and explains why some feeders and milkers get much better results from certain cows than others.

It has been found unnecessary to remove the milk to produce the effect described. The sight of the calf, the manipulation of the teats and massaging of the udder, or the swinging of the udder during a long walk from pasture produces the same effect. It seems evident, therefore, that the reaction is not due to a simple release of pressure in the udder. It seems very probable that it is a nervous reaction. This idea is further substantiated by the reaction of some cows to other types of sensory stimuli, such as the noise of milk pails and other dairy equipment. The noise of the milking machine will also cause these phenomena. Some cows will respond only to feed, and unless fed at milking time will "hold up" their milk. The "letting down" of milk may also appear spontaneously when the interval between milking is increased. It is said, however, that the process is more gradual under these circumstances.

The time that passes from the moment of the stimulation to the "letting down" of the milk varies with individuals between one-fourth and two minutes. It is thought that fresh cows react quicker and more clearly. A noted authority states that not every stimuli applied to the teat will cause the reaction. Stimulation with a needle or an electric current was without effect.

General Notes.

Protection of the Large Spotted Opossum.

An Order in Council has been passed providing for the total protection of the Large Spotted Opossum or Cuscus (*Phalanger maculatus*).

Aliens and the Sugar Industry.

A regulation has now been passed whereby any person engaged in any phase of the sugar industry who employs therein any alien to whom "*The Sugar Cultivation Act of* 1913" applies, must furnish to the Under Secretary, Department of Agriculture and Stock, on the 31st December in each year, a statement in respect of such employees. Any person who is guilty of any contravention of this regulation shall be liable to a penalty not exceeding ten pounds.

Registration Envelopes.

The Postal Department invites attention to the fact that, in order to meet the convenience of persons and firms who would find use for registration envelopes of foolscap size, it has introduced an envelope 9 inches by 4 inches, manufactured of stout paper, and eminently suitable for the transmission of legal documents. The price of the envelope, which is impressed with postage to the value of 4½d., is the same as that charged for the smaller registration envelope—namely, 5½d.

Staff Changes and Appointments.

Constable J. E. Linnane, Merinda, has been appointed Inspector of Slaughter-houses.

Mr. W. W. Farquhar, Shire Clerk at Eidsvold, has been appointed Officer under and for the purposes of the Animals and Birds Acts, in the room of Mr. R. Farquhar, deceased.

Messrs. J. Legg, D.V.Sc., M.R.C.V.S. (Townsville), E. C. Lake (Mareeba), and D. A. Logan (Mackay) have been appointed Collectors of Royalty for the purposes of the Animals and Birds Acts.

Mr. J. L. Froggatt, Department of Agriculture and Stock, has resigned his position as Entomologist as from the 14th August, 1929. Mr. Froggatt is taking up the position of Entomologist to the Territory of New Guinea.

The appointment of Mr. G. P. Randles, of Zillmere, as an Inspector of Slaughter-houses, has been confirmed as from the 21st January, 1929.

The appointment of Mr. Thomas Douglas, Kingaroy, as an Inspector under "*The Diseases in Stock Act of* 1915" has been confirmed as from the 4th January, 1929.

The appointment of Mr. K. King, Cooran, as an Inspector under the Diseases in Plants Acts has been confirmed as from the 23rd January, 1929.

Mr. S. R. C. Harding, Manager of Westgrove Station, has been appointed an officer under and for the purposes of the Animals and Birds Acts.

Mr. W. S. Waugh, of Dalby, has resigned his position as Acting Inspector under "*The Diseases in Stock Act of* 1915" as from the 31st July, 1929.

Mr. J. W. Thompson, of Mayne Junction, has been appointed an honorary officer under and for the purposes of the Animals and Birds Acts.

Mr. B. Dunbavand, Inspector of Slaughter-houses, Ingham, has been appointed also an Inspector under and for the purposes of the Diseases in Stock Act.

On account of ill-health, Mr. W. S. Harding, Inspector of Dairies, Rosewood, has been retired from the Public Service as from the 21st June, 1929.

Mr. Kenneth McL. Gordon has been appointed an Inspector on probation, Agricultural Bank.

The following have been appointed Honorary Inspectors under and for the purposes of the Diseases in Plants Acts:—Messrs. William Smellie, Langshaw; Cecil Quodling, Eel Creek; Bert Du Rietz, Eel Creek; Michael Nolan, Langshaw; and Arthur Robert Deighton, of Yandaran.

The retirement of Mr. F. G. Connolly, of Rockhampton, from the Public Service, as from the 30th June, 1929, has now been cancelled.

Atherton Maize Board.

The period of time for payments by the Atherton Tableland Maize Board has now been fixed from the commencement of the season in each year during which the board may be constituted under "*The Primary Producers' Organisation and Marketing Acts*, 1926 *to* 1928," until the commencement of the season in the next year. This period of time has been prescribed in accordance with a section of the Acts which lays down that the payments to each grower of the commodity delivered to the board are to be on the basis of the net proceeds of the sale of all the commodity of the same quality delivered to and sold by the board during such period of time as may be prescribed.

Peanut Board Election.

Nominations for the appointment of members to the Peanut Board are:—

District No. 1 (Nanango District) two members—
  Charles Frederick Adermann, Wooroolin.
  Frederick Christian Petersen, Kingaroy.

District No. 2 (Central District)—
  Alfred Skinner Clark, Sandhills.

District No. 3 (rest of Queensland)—
  Albert Charles Perske, Degilbo.

Only four members were required and the old board with the exception of Mr. Malcolm Redman, who did not seek re-election, will be appointed for a further term of one year as from the 1st September, 1929. Mr. Petersen is the new member on the board.

The Royal Society of Queensland.

The Ordinary Monthly Meeting was held in the Geology Lecture Theatre of the University on Monday, 24th June. The President, Dr. J. P. Lowson, was in the chair.

Mr. G. H. Hardy read extracts from his paper, entitled "Revisional Notes on the Tribe Brachyrrhopalini; with Remarks on the Habits of and Mimicry Amongst Robberflies." He discussed the generic alliances of species included in the tribe, and incorporated keys to the five genera and fifteen species constituting the group. Observations on the habits of robberflies indicated the possibility that mimicry amongst robberflies may occur, and evidence may be obtained from the fact that certain species regarded as being wasp mimics have habits differing from those of their nearest allies. Particular attention was drawn to *Erythropogon limbipennis* (Macquart), which does not seem to be predaceous.

Dr. T. G. H. Jones read extracts from his paper on "A Contribution to the Chemistry of the Oily Exudate of the Wood of Pentaspodon motleyi (Papua)."

The exudation from the wood of Pentaspodon motleyi on examination has been found to consist essentially of apparently homogeneous acid material, for which the name pentaspodonic acid is proposed. Conclusions as to the constitution of this acid are drawn from various experiments recorded, and it is considered that the acid has a molecular composition $C_{23}H_{34}O_3$. Two unsaturated linkages are present in a long side chain attached to a benzine nucleus. The acid, which is monobasic, also contains one phenolic group.

The Secretary, Mr. F. A. Perkins, M.Sc., read extracts from the paper by John Legg, D.V. Sc., and J. L. Foran entitled "Some Experiments on Tick-infested Cattle with Arsenical Dipping Fluids." The following took part in the discussion which ensued: Dr. Jones, and Messrs. Pound, Jones, Perkins, Henderson, and Schindler.

Mr. H. A. Longman exhibited a small slab of fossiliferous limestone which had been found by Miss Marion Rowland amongst rocks considerably above high-water mark on Magnetic Island, North Queensland. This slab contained, amongst other remains, several specimens of Barnacles, apparently *Coronula* sp., present-day species of which are found parastical on whales. Evidently this slab had been detached from its original statum, and if this could be traced it would be of considerable interest.

Mr. Longman also exhibited specimens of the lower jaws of *Macropus anak* and *M. raechus* from the Darling Downs, which he considered were distinct species as indicated by Owen. He could not agree with De Vis in "lumping" both of these under *Macropus anak*.

The Astor Aeroplane—a Pioneer of Commercial Aviation.

A winged visitor has come up from the South. It is the Astor Radio Aeroplane, the pioneer of aviation applied to commerce in Australia.

Owned and operated by the distributors of the famous "Astor" Brand of Radio Receivers, the Astor Aeroplane has come north under the instructions of the Queensland Distributors—Queensland Pastoral Supplies, Limited, of Brisbane—in continuance of a Commonwealth-wide campaign on behalf of Astor Radio, in which it is planned to cover 800,000 square miles. Already both Victoria and South Australia have been extensively toured and practically every town of prominence visited, including several in which an aeroplane has never before landed.

PLATE 79.—CAPTAIN FRANK ROBERTS.

An ex-Australian Air Force pilot, and a pioneer in the field of commercial aviation in Australia.

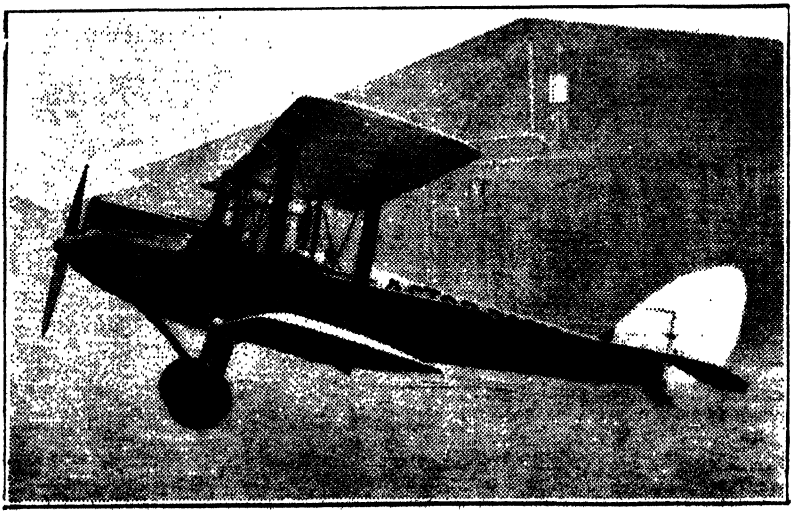

PLATE 80.—THE ASTOR AEROPLANE. A COMMERCIAL PIONEER ON COUNTRY AIRWAYS.

The Astor Radio Aeroplane is a Gypsy-Moth of the latest pattern fitted with the slotted-wing safety device, it is distinctively painted in the black and orange colours of the "Astor" brand. The pilot is Captain Frank Roberts, an ex-war pilot with a distinguished record, who has been engaged in pioneer flying for some years.

Apart from the commercial value of this aerial campaign in introducing radio to the scattered population of this State, the Queensland Pastoral Supplies, Limited, are to be complimented on the singular service they are performing in thus commercially pioneering country airways, and in the awakening of country authorities to the need for establishing properly marked out landing grounds.

The value of commercial aviation to Australian commerce is incalculable, but it will afford some idea of the benefits received when we consider that the special Astor Sales Organiser travelling in the "Astor" 'plane as passenger completed a gigantic sales tour embracing visits to over 200 towns in the space of little over three months, while it would have taken him approximately eighteen months to have covered the same territory by rail and road.

The lack of suitable landing grounds, however, has proved a formidable obstacle to the successful accomplishment of this enterprise; in some cases the "Astor" 'plane being compelled to make risky landings, in one instance in a main street, in another in a marsh.

The response of country municipalities and shire authorities to the responsibility of establishing landing grounds both in Victoria and South Australia has been very encouraging, and this responsibility is becoming recognised in Queensland where the conditions of aerial travel is otherwise so excellent.

A Bush Remedy.

Few people realise the value of the common milk thistle. The milk from this plant is about the best cure for warts that I know of (says a correspondent of the "Sydney Mail"). While going to school in the bush I was told by an old shepherd that the milk would take a fine crop of warts that I possessed right away. I followed his advice, and a few applications of the fluid proved him to be right. That gave me an idea, and I next tried it out on warts on the teats of our milking cows. These growths disappeared, too, and I now never fail to recommend the thistle as a cure for any kind of warts. Tea made by boiling the stalks in water and then straining the fluid is particularly soothing to the nerves, and I have met people who were very insistent that milk thistles would eventually prove to be the only cure for cancer.

Still Room for Adventure.

"The Elizabethan merchant," did his full share in building the British Empire. He was at once an explorer, a trader, a fighter, and a diplomat, and in the latter capacity was not possessed of a too sharply-drawn idea of propriety. While to-day there are no such uncharted territories left, there remain opportunities, for him who would, to make his life one of adventure. The spirit of adventure can be as much a state of mind as a condition of geography. If properly encouraged, the young men of this country could and would build into their lives days of fascinating romance, achievement, or overcoming of obstacles. They need not go to foreign countries to do so. When a young man in America or Canada applies for a post, he asks: 'What is the chance to work up?' and a favourable reply is regarded as of even more importance than the immediate wage. I would like to see that spirit permeating every young man in England to-day. Adventure leans on courage, on enthusiasm, on willingness to risk, on strength of purpose, on indifference to obstacles, and on appreciation of the value of time."—Mr. Gordon Selfridge.

Individuality.

"Those who awake in early life to a fear that they are in danger of being intellectually equipped with bows and arrows to fight in a world where their elders and betters use powder and shot, dimly recognise that individuality is their heritage, and they seek it—or the atmosphere in which it develops—within the confines of their environment. One does not have to be a student of the art of education to come in contact with this ideal," said Mr. H. Lynton Fletcher, of the B.B.C., in a lecture before the Royal Society of Arts on "Educational Broadcasting." "All our literature is full of it. Pestallozzi gave it to the world; Froebel philosophised about it and developed it; Herbert wove a psychology round it; Montessori is full of it; William James never allows one to forget. Sanderson of Oundle applies the principles which underlie it, as, in a lesser degree, Thring of Uppingham did before him. Every psychologist, philosopher, and schoolmaster writes and speaks of it. It is, in fact, universally recognised as the great ideal of education."

The "Astor" Wireless.

The "Astor" wireless, which is so well and favourably known in New South Wales and Victoria, is now being handled in Queensland by the Queensland Pastoral Supplies, Limited. The "Astor" embraces the shielded neutrodyne plus the new screen grid valve and one dial control.

A wide range is kept in stock embracing the all electric and battery series. It is only necessary to turn the switch and one dial to get into touch with Japan, New Zealand, and all Australian stations. Also the duo symphonic radio, which embraces gramophone and wireless. So perfected are the "Astor" sets that the agents give an unconditional guarantee or money back. Easy terms can be arranged if desired. A fine art wireless catalogue setting out the various models is now ready, and will be sent free on application.

Most of the "Astor" models will give daylight reception of all Australian stations.

The catalogue may be obtained by applying to the Queensland distributors, the Queensland Pastoral Supplies, Limited, Brisbane.

Speed the Plough.

The plough is the forerunner of all implements, and the mainstay of thorough cultivation; therefore, the ploughing should receive careful attention. If we fail to plough the land carefully, we neglect the most important feature in the preparation of the land for a crop; whereas, if thoroughly ploughed at an even depth, other implements can also do good work, and the crop will grow more evenly than if badly ploughed. Many consider as long as the surface is turned over it is immaterial whether the work is done evenly or otherwise. Others, however, more experienced in cropping, will, no doubt, have noticed that a field ploughed unevenly, or one that has been roughly disced after ploughing, has practically the same effect—the soil is more or less in ridges. When this is so, there is a greater depth of the richer soil in some parts than in others. In other words, the soil is removed from certain parts, and heaped upon the other parts, thus leaving the well-ventilated or sweetened soil very unevenly distributed. The result of this is that the crop will grow better on the ridges, while in the hollows the foliage will wear a more starved or stunted appearance. It is, therefore, apparent that if an even crop is expected, it is essential that the land should be well ploughed, and afterwards well cultivated. Atmospheric nitrogen is composed chiefly of nitrates and ammonia, and reaches the soil dissolved in rain, as in other forms of water, such as snow, hail, fog, or hoar frost, &c. It is also absorbed by the soil from the air, especially when the soil is in a damp condition. Therefore, soil that has been thoroughly cultivated is in a better condition to draw and retain atmospheric nitrogen, hence the necessity of perfect cultivation.—The "New Zealand Farmer."

Beauty and the Bucket.

It is a common thing for a man who has a poor herd of cows to say that he has "no time for fancy points." He regards the cow which has beauty and symmetry as a "fancy" cow, and the horse that can win a prize as something not worth the attention of a "practical" farmer.

To what extent is this very general opinion justified? Is there in our show rings and in our studs any great difference between our ideas of beauty and of symmetry and the capacity to produce? We think not. Certainly there should not be.

The ideal Clydesdale of the show ring is the horse which, in the view of the most able of our judges, is perfectly equipped for his work. The Clydesdale horse is bred to give service in haulage, and the type we want is that which will give us the greatest power with the least fatigue and the least wear and tear. To ensure that there shall be the least wear and tear, we study conformation; we decide on the best shape of shoulder, on the length and set of pastern.

The ideal beef bull is the beast that will get steers which will carry the greatest quantity of desirable beef at the earliest age. Conformation is our guide again.

The ideal dairy cow is the cow which, year after year, will give us a strong, vigorous calf, and a profitable amount of milk and butterfat. Vigour, capacity for feed and dairy temperament are as necessary as the inherited capacity to produce, and so we look for these points. Conformation—show ring type if you will—is our guide again.

These desirable and "practical" points in a beast are usually associated with more or less beauty and symmetry of form. We call the beast beautiful, or good, which exhibits desirable points of conformation, because, after all, "handsome is as handsome does."—"Live Stock Bulletin."

SUGAR LEVIES.

1929 SEASON.

Regulations under "*The Primary Producers' Organisation and Marketing Acts*, 1926 *to* 1928" have been approved, providing for levies on suppliers of cane to sugar-mills at the following rates for the season 1929 (the figures for 1927 and 1928 are given for comparison purposes) :—

Name of Mill.	General Levy by Queensland Canegrowers' Council.	Defence Fund Levy by Queensland Canegrowers' Council.	Administrative Levy by District Executive.	Administrative Levy by Mill Suppliers' Committee.	Extra Levy by Mill Suppliers' Committee.	Total Levies for 1929.	Total Levies for 1928, given for comparison.	Total Levies for 1927, given for comparison.
	d.	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*
Mossman Central	¾	1	3	..	..	4¾	5⅞	6¼
Hambledon	¾	1	⅜	⅛	..	2¼	2⅛	2½
Babinda Central	¾	1	⅜	..	..	2⅛	1⅞	2¼
Mulgrave Central	¾	1	⅜	..	..	2⅛	1⅞	2¼
South Johnstone Central	¾	1	1½	..	..	3¼	4¼	5¼
Goondi	¾	1	1½	..	..	3¼	3¼	5¼
Mourilyan	¾	1	1½	..	..	3¼	3¾	5¼
Tully River Central	¾	1	1½	¼	..	3½	4¼	5½
Macnade	¾	1	¼	¼	..	2¼	2¼	3
Victoria	¾	1	¼	¼	..	2¼	2¼	3
Kalamia	¾	1	..	1	..	2¾	2¾	3½
Pioneer	¾	1	..	1	..	2¾	2¾	3½
Inkerman	¾	1	..	¼	..	2	2¼	2½
Invicta	¾	1	..	1½	..	3¼	2¾	4
Proserpine Central	¾	1	2½	..	..	4¼	3¾	4½
Cattle Creek Central	¾	1	1	..	..	2¾	2¾	3
Plane Creek Central	¾	1	1	..	..	2¾	2¾	3
Marian Central	¾	1	1	..	..	2¾	2¾	3
North Eton Central	¾	1	1	..	..	2¾	2¾	3
Pleystowe	¾	1	1	..	½	3¼	3¾	4
Racecourse	¾	1	1	..	..	2¾	2¾	3
Farleigh	¾	1	1	..	..	2¾	2¾	3
Qunaba	¾	1	¼	..	..	2	2	2¾
Bingera	¾	1	¼	¾	..	2¾	2¾	3
Fairymead	¾	1	¼	..	..	2	2½	3¼
Gin Gin Central	¾	1	¼	¼	..	2¼	2¾	2½
Millaquin	¾	1	¼	..	..	2	2½	2¾
Isis Central	¾	1	¼	¼	..	2¼	2¼	*3½ †4
Childers	¾	1	¼	..	..	2	2	2¼
Maryborough	¾	1	¼	½	..	2½	2½	2¾
Mount Bauple Central	¾	1	¼	½	..	2½	2½	2¾
Moreton Central	¾	1	½	1¼	⅝	4⅛	3⅞	4⅜
Rocky Point	¾	1	½	¾	..	3	2¾	3

* Booyal. † Pialba.

No poll will be taken in respect of the General Levy of ¾d. per ton (1st column) for the Queensland Canegrowers' Council; but before the other levies are made, growers are given the opportunity of petitioning, before 3rd September, 1929, for a poll to decide whether or not any particular levy shall be made. In the case of the levy of 1d. for a Defence Fund, the petition must be signed by at least 100 canegrowers. In the case of any of the other three levies, the petition must be signed by at least 100 or 50 per cent. (whichever shall be the less) of the cane suppliers to any particular mill.

The Defence Fund Levy (2nd column) will be utilised for the purpose of creating a Defence Fund for the Queensland Canegrowers' Council. The levies by District Executives (3rd column) will be utilised for administration purposes of the respective District Canegrowers' Executives in the respective districts.

The levies mentioned in the 4th column will be used for administration purposes of the respective Mill Suppliers' Committees in the respective districts.

In the 5th column the levy on cane supplied to the Pleystowe Mill will be used in defraying the expenses of employing a check weighman at the mill, while the levy on cane supplied to the Moreton Central Mill will be utilised in defraying the costs of employing a farmers' representative at that mill for the current season.

Full particulars of these Regulations appear in the *Government Gazette* of the 1st August, 1929, or may be obtained on application to the Managers of the various sugar-mills in Queensland or to the undersigned—

E. GRAHAM, Under Secretary,
Department of Agriculture and Stock,
Brisbane.

Duke of York Seed Wheat

Applications for graded supplies of seed of this new wheat should be made direct to the Under Secretary, Department of Agriculture and Stock, Brisbane. Remittances, with exchange added, must accompany orders.

Price, 8s. per bushel, freight paid to the purchaser's nearest railway station within the Southern Queensland Wheat Belt.

Supplies of seed are limited, and orders will be filled according to priority.

This variety was bred at the Roma State Farm, and is a cross between Cretan, Bunge, and Gluyas. It stools well; is prolific; medium early with fairly erect firm straw of medium height; and has red-tinted chaff which does not readily shatter. The grain resembles Gluyas in appearance, but Duke of York is a decided improvement on that well-known variety. It is also a fair rust resister and a good milling wheat. Tested out under field conditions, Duke of York wheat has yielded up to 50 bushels per acre. In last season's Wheat Crop Competition, a field of this variety was awarded second in district competition, and third in Grand Championship.

The Home and the Garden.

OUR BABIES.

Under this heading a series of short articles by the Medical and Nursing Staff of the Queensland Baby Clinics, dealing with the welfare and care of babies, has been planned in the hope of increasing their health and happiness and decreasing the number of avoidable cases of infant mortality.

YOUR CHILD'S TEETH.

The first or temporary teeth are formed long before birth. Every baby is born with a mouthful of teeth, though they are under the gums and cannot be seen. Somewhere about the seventh month—the exact age varies much even in healthy babies—the first tooth appears, usually a lower middle incisor (or front tooth). Within the next two months all the incisor teeth may be cut. About the beginning of the second year the first milk molars (or back teeth) appear. At about eighteen months the canine or eye teeth emerge between these and the incisors; about the end of the second year the second milk molars. This completes the first set of teeth, twenty in all.

Teething is not a disease. It is a perfectly healthy process which often gives rise to no trouble at all. At the worst there may be a little fretfulness and dribbling, when the gums are swollen, in a healthy baby. When a baby is sick from any cause the uncut teeth appear to ache, and the mother is apt to mistake this aching for the cause of the illness. As all babies are "teething" from six months to two years of age, this is a very convenient excuse for all the troubles caused by want of knowledge and care.

At birth the crowns of the first permanent molars are already beginning to form; those of all the other permanent teeth are formed inside the gums during the first three years of life, though they do not appear until much later. The first permanent molars appear at about six years behind the milk molars. They are often mistaken for temporary teeth, and allowed to decay early—a very serious error, for they are intended to last a lifetime. Within the next two years the roots of the temporary incisors are absorbed and they fall out, to be replaced by permanent teeth. Within another two years the same happens to the milk molars, later still to the canine or eye teeth, and the second permanent molars appear. The last or wisdom teeth, which complete the permanent set of thirty-two, come much later.

The Formation of Good Teeth.

No care after birth will affect the formation of the first set of teeth. To have good teeth the baby must be born of a healthy mother, one who takes plenty of fresh air and exercise, who chooses her food wisely (including fresh milk, eggs, uncooked fruit, and vegetables), but does not eat overmuch, who takes no alcohol, who is not troubled by indigestion (perhaps caused by her own bad teeth), constipation, or kidney disease, and who can thus supply the good blood out of which good teeth are made.

As the permanent teeth are formed in the first three years of life, their good development depends on the care that is taken of those years. For their perfection and durability the baby should be suckled with human milk, the only substance which contains all the materials for forming good teeth in best proportions. If the baby has, unfortunately, to be bottle-fed he should have good cow's milk by preference and a small quantity of cod-liver oil may be advantageous.

The Dummy Condemned.

He should have no "dummy," which tends to deform the jaws and crowd the teeth so that they cannot develop properly. After weaning he should be carefully fed with right foods.

When the baby is six months old he should have a bare bone to bite. When he is nine months old he should have a tiny crust or finger of bread baked hard and crisp in the oven. Thereafter he should be given baked bread instead of soft bread and butter. His crusts should be hard and crisp but not tough. Before he is two years of age baby should have learnt to bite other hard foods, including a piece of raw apple, which is a good teeth cleanser. Jaws that do no work and have no exercise will not grow strong teeth. Mothers are destroying teeth by feeding babies entirely on pap and mush.

Any serious illness or prolonged failure of nutrition during the first three years, although it may be completely recovered from in every other respect, may leave the permanent teeth imperfect.

Teeth More Precious than Pearls.

Children's teeth are more precious than pearls; we wish as much care were taken of them. School age in this State commences at six years, and soon after entering school the children's teeth are inspected by the school dentists. Not more than *one in twenty* have a clean mouth. Of their fair white infant teeth many are discoloured and broken, some are septic and offensive, some have caused abscesses. Many of these children have suffered from toothache, many of them have been unable to masticate properly and have acquired the habit of bolting soft food; some have been partly poisoned by swallowing foul secretions. Worse than all, owing to the loss of temporary teeth, the jaws have not grown properly, the permanent teeth are crowded and ill-developed. Often the six-year-old molars begin to decay soon after they have erupted. It is a dismal picture. No wonder that many children grow up undersized, ill-developed and weakly; poorly equipped to meet the strains and stresses of after life.

Knowledge and Care Needed.

Let us try to understand the reasons for this. Some children, as we have already explained, have weakly constructed teeth to begin with, but most of the trouble is due to sheer destruction caused by want of knowledge and proper care. Nature has capped every tooth with one of the hardest substances known, called enamel. It is formed by living cells beneath the gums, but once formed it is a dead tissue, and once destroyed can never be replaced. Nature has therefore made it very hard and resistant, capable of crushing, and grinding, and lasting. It has one weakness—being formed of lime salts, it is dissolved slowly but surely by acids. To guard it from this danger Nature keeps it constantly bathed by an alkaline fluid, the saliva. So cunningly has Nature contrived the mechanism of the salivary glands that they are stimulated to action by all pleasant acid flavour, such as those of fruit juices, which flood the mouth with alkaline saliva. But tasteless, insipid, and alkaline foods do not stimulate the salivary glands, but discourage them. Nature's safeguards were almost perfect until mankind commenced to feed on large quantities of starchy foods and sugar, against which her defensive mechanism was insufficient. These destroy the enamel by forming a paste lodging in the small cavities of the teeth, and the spaces between the teeth, or a glutinous deposit on the teeth. These pastes and sticky substances cannot be penetrated by the saliva, and slowly ferment as they adhere, forming acids. Each atom of acid, as it is formed, unites with an atom of lime from the enamel. As this goes on day after day, month after month, year after year, the enamel becomes petetrated at its weakest spots. Once it is penetrated, the interior of the tooth begins to decay, the living pulp becomes inflamed, and the tooth is lost. In the early stages the dentist can save the tooth by skilful treatment. In the later stages the tooth should be extracted; it is then a source of weakness and poison.

Prevention Better than Cure.

Prevention is better than cure. Preserve your children's teeth by feeding them in such a way as to assist Nature's defensive mechanism, and not frustrate it. Nature has some difficulty in dealing with bread and butter; a little acid jam will assist her. Bread and butter between meals will in time destroy the teeth; sweet cake will do so more quickly; biscuits made of finely-ground flour (so much advertised and so much used) are even worse. Every meal should contain some acid substance, such as stewed fruit, even canned fruit will do, but without too much sugar. Or a little fresh fruit may be given at the end of the meal, and this is best of all. Apples and oranges are the safest and best, but any acid fruit may be given with care. Understand that we do not say that children should be given too much fruit, but a little fruit at the end of the meal.

The Value of Fruit Juices.

You may not always be able to give fruit. Then give acid drinks. Children like them, and they are inexpensive. Lemonade made with weak lemon juice and water with not too much sugar, or bottled limejuice, or a syrup you can make yourself with citric or tartaric acids are all good. Lemon trees are very hardy, and there are few backyards in the coastal districts in which they will not grow. Tea lessens the secretion of saliva, and for this and other reasons should not be given to children.

Harmful Sweets for Children.

We give our children too much sugar. In excess sugar combines with the mucus of the mouth to form a sticky coating on the teeth impenetrable to the saliva. Sweetmeats and lollies are harmful. None of them are good, but the old-fashinoned acid drops and peppermint bulls-eyes were not so bad as chocolates and soft sweets. Children like sweets, but they like fruit better, and fruit in moderation is good for them. Above all, be careful what you give the child in the evenings. The surest way to destroy his teeth quickly is to give him a chocolate or a biscuit when he goes to bed. All night it will be corroding his teeth undisturbed.

Starting a Good Habit.

When your child gets old enough let him see you clean your teeth the last thing before he goes to bed. He will want to imitate. Let him use a small tooth brush. The mouth should be wide open, not shut, and the teeth should be brushed gently inside, outside, and on the top—brushed as you would brush a dress, not scrubbed as you would scrub a floor. Dip the brush in the fruit acid toothwash described below, and teach him to rinse out his mouth with this afterwards. He should not swallow it, but if he swallows a little it will not harm him. The tooth brush should be carefully rinsed and kept dry.

When to Call on the Dentist.

Watch your children's teeth carefully, and if there is anything wrong take them to a dentist. Indeed, it would be a good thing if all children had their teeth examined by a dentist once a year, whether they appear sound or not. All teeth showing the first signs of decay should be stopped at once before they get worse. This will save much trouble and expense afterwards, for if the temporary teeth are neglected the permanent teeth may be ruined. The most important of all the teeth to save are the six-year molars, which come through behind the temporary teeth sometimes without the mothers noticing them. They are mistaken for temporary teeth, allowed to decay, and the whole permanent set is spoilt. Dentists consider them "the key of the arch."

Fruit Acid Tooth Wash.—Cream of tartar, one flat teaspoonful. Dissolve in one pint of water, and add two or three tiny saccharin tablets, procurable from any chemist. This makes a pleasant acid-sweet solution, which costs very little. Unfortunately, it does not keep, and is suitable only for schools. For domestic use, obtain some "fruit acid tooth wash tablets" from your chemist.

BABY CLINICS.

The "Dummy."

There is no surer sign of want of knowledge of the right way to manage a baby than the use of a "dummy." Before many years the mothers of Queensland will learn this so well that they will be ashamed to be seen using it.

Reasons Why You should not use a "Dummy."

1. In the newborn babe to suck is a natural instinct, and is the most powerful agent in establishing the secretion of breast milk. If this instinct is diverted to the sucking of a "dummy," it is often partly exhausted before the baby is put to the breast. He does not suck vigorously, and in consequence the supply of milk becomes deficient. Soon he may prefer his "dummy" and the milk may disappear altogether. This is a common reason for failure to establish breast feeding.

2. The "dummy" is a dirty thing. It drops on the floor and picks up dirt, which the baby swallows. If pinned to the baby's frock it is exposed to dust and flies. Every summer we have a serious epidemic of dysentery spread by flies. Mothers who use "dummies" during this season are exposing their babies to infection with a disease which is always grave and sometimes fatal.

3. Dummy-sucking, like thumb-sucking, interferes with the growth of the jaws and the development of the teeth. It favours the development of a high and narrow-roofed mouth and narrow nasal passages, which become easily obstructed.

4. The use of the "dummy" soon results in the formation of a bad habit, and may lay the foundation of a weak and self-indulgent character.

A baby never cries for a "dummy" until he has been trained to expect it, but there are a number of reasons why he may cry, and these should be known to every mother.

Why do Babies Cry?

The first thing a baby does is to cry. This is how he expands his lungs for breathing. A very young baby cries to strengthen his chest. Let him. In moderation, of course, a good healthy cry will do him no harm.

A baby cries because he is hungry. This also is healthy. If he cries after he is fed it may be because he is not getting enough. The Clinic nurse will probably be able to increase the quantity of your breast milk. If not, she will advise you what to give him after each feed. Never put a breast-fed child on full bottle feeds. If you do this you will soon lose what breast milk you have.

Very often a baby cries because he has colicky pains after feeding. Sit him up after the feed, or put him over your shoulder, so that he may easily get rid of the wind he has swallowed. If that does not soothe him, you may be giving him the wrong food, or too much of the right food. Over-feeding with breast milk is a common way of making crying babies. Perhaps giving the breast soothes him for a short time but makes him worse afterwards.

He may cry because he feels cross and irritable. This is usually due to over-feeding or giving the wrong food. Perhaps he is thirsty in hot weather and wants a drink of water, not milk.

He may cry because he is uncomfortable. Perhaps he has a wet napkin, or a tight binder, or too many clothes on a hot day.

He may cry because he wants his own way. You may have taught him to expect to be rocked to sleep, or to suck a dummy, and he cries because he knows that will bring him what he wants. It is very easy to teach a young baby bad habits; not so easy to break them.

If you want to be a good mother, try to find out why your baby cries. Do not treat him as if he were a bottle, and a dummy were the cork.

THE ROSE GARDEN.

In planning a rose garden it is essential to keep in mind the fact that it is a garden in itself, and does not lend itself with any particular advantage to the remainder of the garden. In other words, it is a specialised garden within the general garden, and as such should receive entirely separate attention. To do this, the first point to be remembered is that it should be screened off, in some way, from the garden as a whole. Evergreen hedges, shrubs, supports carrying climbing roses, rose species or a Rosa rugosa hedge are all satisfactory for this purpose.

The next point to remember is that a rose garden is essentially formal in character, and so definite mathematical planning may be successfully carried forward. The beds should be small so that they may be readily cultivated from the surrounding paths; and preferably each bed should be planted with roses of one colour or, if possible, with one variety. The shape of the bed is not of particular importance, as varied interesting effects may be obtained by having them shaped irregularly, while an entirely satisfactory result may be secured, and much more easily too by the beginner, if circular and square or rectangular beds alone are used.

The paths should be straight. Grass paths are preferable to gravel paths, being easy to walk on, restful to the eye, and showing up the rose blooms to greater advantage. The width of the paths is determined largely by the size of the garden, central walks in a large garden being of very good width. In the small garden much labour will be saved by having the grass paths just the width of the lawn mower, so that each path needs to be gone over once only in cutting the grass.

It is usual to have a centre piece in the rose garden—simple or ornate, according to the taste of the owner. A sun-dial or bird bath is very satisfactory, or in larger gardens a fountain may be used.—"The Canadian Horticulturist."

COUNTRY WOMEN AT WORK.

The Country Women's Association is a banding together of women all over Australia in a bond of love and friendship; and every member is expected to render as much service as lies in her power to her fellow women.

A branch is formed primarily with the intention of creating friendliness among women of the district. After meeting, the natural desire is to work together in this new "oneness" for some objective. So come into being hostels, hospitals, seaside homes, and huts, and the many other objectives of the association.

The objects of the association, as stated in the constitution and rules, are being carried out to a wonderful extent. In order to show in what way these objectives are being carried out it might be well to mention first the objective and then the ways in which it is being met.

1. "To improve the welfare and conditions of life of women, girls, and children in the country."

Most of the branches have rest rooms, which members and country women and children can visit and have a cup of tea, rest between trains or leave children it they are shopping.

Rest tents on show grounds during show weeks are arranged by the majority of the 300 branches. Emergency funds are established, the funds to be expended upon necessitous cases. Most branches keep a supply of clothing on hand to send to those in need of it. Travellers aid committees make much easier the journeys of country women. Families who are unable to afford a needed holiday at the seaside are often sent by the branch to which they belong.

Branch Activities.

2. "To draw together all women, girls, and children in the country." Each month members meet together, and in most cases the afternoon is a social one. Lectures and demonstrations are given on such subjects as leather and raffia work, pastry making, poultry raising, and other domestic arts. Special afternoons are arranged for children.

3. "To provide opportunities for recreation and enjoyment, bringing them within reach of all members." Every branch at Christmas time provides Christmas trees or some special pleasure for children in their districts, and gifts are given to patients in hospitals.

Libraries have been opened in places where there are no schools of arts. In quite a number of cases recreation grounds have been provided for children.

4. "To encourage women to take an active part in country development by working on committees, such as schools, hospital, ambulances, &c., and to promote a wise and kindly spirit in the community."

Branches of the association have representation on local committees, such as schools of arts, &c., and in one or two cases on hospital boards. Ambulances have the wholehearted support of the association everywhere. Any local interests have the support of branches in raising funds for the welfare of the towns and districts.

5. "To improve educational facilities in the country."

The establishment of educational hostels at Warwick (for girls) and Bundaberg (for boys) is a forward step in the association's desire to assist with the education of country children.

First-aid classes are arranged by many branches with the co-operation of the ambulance brigade.

6. "To secure better provision for the safeguarding of public health, especially of women and children, and to secure medical and hospital facilities for country districts."

The need of accommodation for waiting mothers has long been felt. To meet this need hostels for waiting mothers have been established at Goondiwindi, Warwick, and Stanthorpe.

In towns where there are no hospitals, and sometimes no resident doctors, emergency hospitals and homes have been established.

Branches have provided X-ray plants for local hospitals, and have been instrumental in having maternity wards added to country hospitals.

Members help in providing linen, crockery, &c., for hospitals; nearly every branch in whose district there is a hospital has its visiting committee.

KITCHEN GARDEN.

Now is the time when the kitchen garden will richly repay all the labour bestowed upon it, for it is the month for sowing many kinds of vegetables. If the soil is not naturally rich, make it so by a liberal application of stable manure and compost. Manure for the garden during summer should be in the liquid form for preference. Failing a sufficient supply of this, artificials may be used with good results. Dig or plough the ground deeply, and afterwards keep the surface in good tilth about the crops. Water early in the morning or late in the evening, and in the latter case stir the soil early next day to prevent caking. Mulching with straw, leaves, or litter will be a great benefit as the season becomes hotter. It is a good thing to apply a little salt to newly-dug beds. What the action of salt is is not exactly known, but when it is applied as a top dressing it tends to check rank growth. A little is excellent for cabbages, and especially for asparagus, but too much renders the soil sterile and causes hardpan to form. French or kidney beans may now be sown in all parts of the State. The Lima bean delights in the hottest weather. Sow the dwarf kinds in drills 3 ft. apart and 18 in. between the plants, and the climbing sorts 6 ft. each way. Sow Guada beans, providing a trellis for it to climb on later. Sow cucumbers, melons, marrows, and squash at once. If they are troubled by the red beetle, spray with Paris green or London purple. In cool districts peas and even some beetroot may be sown. Set out egg plants in rows 4 ft. apart. Plant out tomatoes 3½ ft. each way, and train them to a single stem, either on stakes, trellis, or wire netting. Plant out rosellas. Sow mustard and cress, spinnach, lettuce, vegetable marrows, custard marrows, parsnips, carrots, chicory, eschalots, cabbage, radishes, kohl-rabi, &c. These will all prove satisfactory provided the ground is well worked, kept clean, and that water, manure, and, where required, shade are provided.

FIVE REASONS IN FAVOUR OF THE HOME VEGETABLE GARDEN.

(1) Fresh vegetables, especially vegetables containing vitamines, are essential to good, robust health, and medical men are now advising people to "eat more vegetables."

(2) The growing of vegetables not only means a saving of money, but educates the children by inculcating a desire to have their own gardens in later life, and so help to keep down the costs of living.

(3) Vegetable-growing is not only a healthy occupation, but it also provides exercise and recreation. In the suburbs it has a tendency to keep young people contented at home, and to trouble less about going to horse races and places of gambling. With country people who, perhaps, are less in need of exercise, gardening is a delightful hobby.

(4) It enables private gardeners to improve the strains of vegetables by a careful selection of seed, much in the same way that a flockmaster improves his sheep; and much satisfaction, and not unusually generous reward are to be gained from this work.

(5) The home garden enables the testing out, in a small way, of the newer varieties of vegetables, which work is not always possible, or, if it is possible, not payable with the professional or commercial gardener. The amateur gardener will find this work both fascinating and health-giving.

BEAUTY IN ENVIRONMENT.

"I come straight from two cities where the common folk find an environment which fits in with their sense of beauty—one is ancient Athens, the other is Venice," said the Archbishop of Canterbury at the recent Royal Academy banquet. "In such cities it was possible for the citizens to understand, encourage, and rejoice in great art. But what of our England? We have, indeed, noble buildings, both old and new, but more and more they are set in acres of surrounding vulgarity. Drab and dreary suburbs are crawling everywhere into the countryside. The eye which yearns for beauty and form is affronted at every turn by hideous petrol pumps and tawdry bungalows 'with every modern convenience.' It may be true that the cult of ugliness is diminishing, but the power of ugliness is day by day increasing. How can the civic sense of beauty survive the progress of a civilisation which, if I may borrow the rhetoric of George Wyndham, is 'making a desert of the past and a dustheap of the future'? In a community which suffers these things the general sense of beauty must, sooner or later, perish, and with it all capacity to understand any form of noble art."

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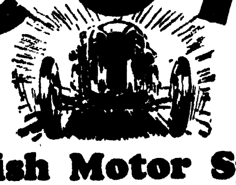

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Farm Notes for September.

With the advent of spring, cultivating implements play an important part in farming operations.

The increased warmth of soil and atmosphere is conducive to the growth of weeds of all kinds, particularly on those soils that have only received an indifferent preparation.

Potatoes planted during last month will have made their appearance above the soil, and where doubt exists as to their freedom from blight they should be sprayed with either Burgundy or Bordeaux mixture as soon as the young leaves are clear of the soil surface.

Land which has received careful initial cultivation and has a sufficiency of sub-surface moisture to permit of a satisfactory germination of seeds may be sown with maize, millets, panicum, sorghums, melons, pumpkins, cowpeas, broom millets, and crops of a like nature provided, of course, that the areas sown are not usually subjected to late frosts.

Rhodes grass may be sown now over well-prepared surfaces of recently cleared forest lands or where early scrub burns have been obtained, and the seed is sown subsequent to showers. More rapid growths, however, are usually obtainable on areas dealt with, say, a month later.

In connection with the sowing of Rhodes grass, farmers are reminded that they have the Pure Seeds Act for their protection, and in Rhodes grass, perhaps more than any other grass, it is necessary that seed of good germination only should be sown. A sample forwarded to the Department of Agriculture will elicit the information free of cost as to whether it is worth sowing or not.

Where the conditions of rainfall are suited to its growth, paspalum may be sown this month.

The spring maize crop, always a risky one, requires to be sown on land which has received good initial cultivation and has reserves of soil moisture. Check-row seeding in this crop is to be recommended, permitting as it does right-angled and diagonal cultivation by horse implements, minimisng the amount of weed growth, and at the same time obtaining a soil mulch that will, with the aid of light showers, assist to tide the plant over its critical period of "tasselling."

Although cotton may be sown this month, it usually stands a better chance if deferred until October. The harvesting of cotton during the normal rainy season is, if possible, to be avoided.

The sowing of intermediate crops prior to the preparation of land for lucerne sowing should be carried out in order that early and thorough cultivation can take place prior to the autumn sowing.

The following subsidiary crops may be sown during the month:—Tobacco and peanuts; plant sweet potaoes, arrowroot, sugar-cane, and cow cane (preferably the 90-stalked variety), and in those districts suited to their production yams and ginger. Plant out coffee.

Orchard Notes for September.

THE COASTAL DISTRICTS.

September is a busy month for the fruitgrowers in the coastal districts of this State, as the returns to be obtained from the orchards, vineyards, and plantations depend very largely on the trees, vines, and other fruits getting a good start now.

In the case of citrus orchards—especially in the southern half of the State—it is certainly the most important month in the year, as the crop of fruit to be harvested during the following autumn and winter depends not only on the trees blossoming well but, what is of much more importance, that the blossoms mature properly and set a good crop of fruit.

This can only be brought about by keeping the trees healthy and in vigorous growth, as, if the trees are not in this condition, they do not possess the necessary strength to set their fruit, even though they may blossom profusely. The maintenance of the trees in a state of vigorous growth demands—first, that there is an adequate supply of moisture in the soil for the requirements of the trees; and, secondly, that there is an adequate supply of the essential plant-foods available in the soil.

With respect to the supply of moisture in the soil, this can only be secured by systematic cultivation, except in seasons of good rainfall or where there is a supply of water for irrigation. As a rule, September is a more or less dry month, and when it is dry there is little chance of securing a good crop of fruit from a neglected orchard.

If the advice that was given in the Notes for August regarding the conservation of moisture in the soil has been carried out, all that is necessary is to keep the soil stirred frequently, so as to prevent the loss of moisture by surface evaporation. If the advice has been ignored, then no time should be lost, but the soil should be brought into a state of good tilth as quickly as possible.

Where there is a supply of water available for irrigation, the trees should receive a thorough soaking if they require it. Don't wait till the trees show signs of distress, but see that they are supplied with an adequate supply of moisture during the flowering and setting periods.

It is probable that one of the chief causes why navel oranges are frequently shy bearers in the coastal districts is that the trees, though they produce a heavy crop of blossoms, are unable to set their fruit, owing to a lack of sufficient moisture in the soil at that time, as during seasons when there is a good rainfall and the trees are in vigorous growth, or where they are grown by irrigation, as a rule they bear much better crops. The importance of maintaining a good supply of moisture in the soil is thus recognised in the case of this particular variety of citrus fruit.

When the trees show the want of sufficient plant-food—a condition that is easily known by the colour of the foliage and their weakly growth—the orchard should be manured with a quick-acting, complete manure, such as a mixture of superphosphate, sulphate of ammonia, and sulphate of potash, the plant-foods which are soluble in the water contained in the soil and are thus readily taken up by the feeding roots.

Although the above has been written mainly in respect to citrus orchards, it applies equally well to those in which other fruit trees are grown. Where the land has been prepared for bananas, planting should take place during the month. If the plantation is to be made on old land, then the soil should have been deeply ploughed and subsoiled and brought into a state of perfect tilth prior to planting. It should also receive a good dressing of a complete manure, so as to provide an ample supply of available plant-food. In the case of new land, which has, as a rule, been scrub that has been recently fallen and burnt off, the first operation is to dig the holes for the suckers at about 12 ft. apart each way. Good holes should be dug, and they should be deep enough to permit the top of the bulb or corm of the sucker to be 6 in. below the surface of the ground.

Care should be exercised in the selection of suckers, butts, or bits. Either of the two latter are preferable, and in the case of suckers which have broken into leaf, these should also be cut hard down to the butt. Before planting all roots should be cut off closely and the surface pared or scraped, excepting over the buds or eyes which are allowed for development. Where the butts are split into sections (up to four) according to the number and placements of eyes, these are planted with the eye or eyes facing downwards. In the case of butts, 2 to 3 eyes are left spaced around the butt, any surplus ones being removed. The top having previously been cut down to the corm and the centre scored out. Better growth is evidenced in each case, and as no cut surface is made available (each "plant" being covered by a few inches of soil immediately) beetle borer infestation is not shown.

In old banana plantations keep the ground well worked and free from weeds and remove all superfluous suckers; also all bases of plants which have fruited.

When necessary manure—using a complete fertiliser rich in potash, nitrogen, and phosphoric acid, such as a mixture of meatworks manure and sulphate of potash —2 of the former to 1 of the latter.

Pineapples can also be planted now. The ground should be thoroughly prepared —viz., brought into a state of perfect tilth to a depth of at least 1 ft., more if possible—not scratched, as frequently happens; and when the soil requires feeding, it should be manured with a complete manure, which should, however, contain no superphosphate, bonedust or Nauru phosphate being preferable.

Old plantations should be kept in a good state of tilth and be manured with a complete fertiliser in which the phosphoric acid is in the form of bonedust, basic phosphate, or finely ground phosphatic rock, but on no account as superphosphate.

The pruning of custard apples should be carried out during the month, leaving the work, however, as late in the season as possible, as it is not advisable to encourage an early growth, which often means a production of infertile flowers. If the weather conditions are favourable passion vines can also be pruned now, as if cut back hard they will make new growth that will bear an autumn crop of fruit instead of one ripening during the summer.

Grape vines will require careful attention from the time the buds start, and they should be regularly and systematically sprayed with Bordeaux mixture from then till the time the fruit is ready to colour, in order to prevent loss by downy mildew or anthracnose. Sulphuring may be required against powdery mildew.

Where leaf-eating beetles, caterpillars, or other insects are present, the trees or plants on which they are feeding should be sprayed with arsenate of lead. All fruit-fly infested fruit must be gathered and destroyed and on no account be allowed to lie about on the ground, as, if the fly is allowed to breed unchecked at this time of the year, there is very little chance of keeping it in check later in the season.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Where not already completed, the winter spraying with lime-sulphur should be finished as early in the month as possible. Black aphis should be fought wherever it makes its appearance by spraying with a tobacco wash, such as black-leaf forty, as if these very destructive insects are kept well in hand the young growth of flowers, leaves, wood, and fruit will have a chance to develop.

The working over of undesirable varieties of fruit trees can be continued. The pruning of grape vines should be done during the month, delaying the work as long as it is safe to do so, as the later the vines are pruned the less chance there is of their young growth being killed by late frosts. Keep the orchards well worked and free from weeds of all kinds, as the latter not only deplete the soil of moisture but also act as a harbour for many serious pests, such as the Rutherglen bug.

New vineyards can be set out, and, in order to destroy any fungus spores that may be attached to the cuttings, it is a good plan to dip them in Bordeaux mixture before planting. The land for vines should be well and deeply worked, and the cutting should be planted with one eye only out of the ground and one eye at or near the surface of the ground.

In the warmer parts which are suitable for the growth of citrus fruits, the land must be kept well cultivated, and if the trees need irrigating they should be given a good soaking, to be followed by cultivation as soon as the land will carry a horse without packing.

In these parts fruit fly should be systematically fought, as it will probably make its appearance in late citrus fruits and loquats; and if this crop of flies is destroyed, there will be every chance of the early crops of plums, peaches, and apricots escaping without much loss.

MANURE FOR CABBAGES.

To grow cabbages well plenty of manure should be used. There is no manure to which this crop responds so well as animal. For heavy lands horse manure, and for light soils cow or pig are respectively the best when they can be obtained. If the soil is of a poor quality, dig the ground two spits deep, and put a good layer of manure between the two spits. This is especially necessary in the case of autumn or summer crops, which have to stand a dry spell. Spring cabbage—that is, those that are planted in the autumn for use in the spring—do well if planted on ground that has been well worked and manured previously for peas or onions, and on such ground cabbages can be planted without any fresh manure being added. Of other manures lime is an important factor in successful cabbage culture; it is chemically and mechanically beneficial to the soil, and the cabbage tuber. It should be applied at the rate of about 2 lb. to the square yard, and is particularly necessary to heavy soils and those rich in humus. Superphosphate at the rate of 2 oz. to the square yard is good, but should not be applied at the same time as lime or to soils that are infected with club root. When the crop is nicely established, apply 1 oz. of sulphate of ammonia to heavy, damp land, or 1 oz. of nitrate of soda per square yard in the case of light or sandy soil. Nitrate of soda is a splendid fertiliser for the cabbage family. When especially fine heads are required, water the plants once or twice during the growing season with the following mixture:—1 oz. of iron sulphate and 2 oz. of sulphate of ammonia dissolved in 1 gallon of water.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

	August, 1929.		September, 1929.		MOONRISE. Aug., 1929.	MOONRISE. Sept., 1929.
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
					a.m.	a.m.
1	6.37	5.19	6.9	5.35	2.22	4.25
2	6.37	5.19	6.9	5.36	3.28	5.15
3	6.36	5.20	6.8	5 36	4.37	5.59
4	6.35	5.21	6.7	5 37	5.41	6.36
5	6 34	5 22	6.6	5.37	6.38	7.9
6	6.34	5 23	6.5	5 38	7.26	7.44
7	6.33	5.23	6 5	5.39	8.6	8 15
8	6.32	5.24	6.4	5.40	8.42	8.46
9	6.31	5.24	6.3	5.40	9.13	9.22
10	6.30	5.25	6.2	5.40	9 46	10.1
11	6.29	5.25	6.0	5.41	10.16	10.43
12	6.28	5.26	5.59	5 41	10.51	11.32
13	6.27	5.26	5.58	5.41	11.26	12.23
					p.m.	
14	6.26	5.27	5.56	5.42	12.5	1.15
15	6.25	5.27	5.54	5.42	12.49	2.10
16	6.24	5.28	5.52	5.42	1.39	3.8
17	6.24	5.28	5.51	5.43	2.31	4.6
18	6.23	5.29	5 50	5.43	3.14	5.3
19	6.22	5.29	5.49	5.44	4.19	6.1
20	6.21	5.29	5.48	5.44	5.20	6.57
21	6.20	5.30	5.47	5.45	6.15	7.56
22	6.19	5.30	5.46	5.45	7.11	8.59
23	6 18	5.31	5.45	5 46	8.8	10.3
24	6.17	5.31	5.43	5.46	9.5	11.9
25	6.16	5.31	5.42	5.47	10.3	...
						a.m.
26	6.15	5.32	5.40	5.47	11.4	12.16
27	6.14	5.32	5.39	5.48	...	1.18
					a.m.	
28	6.13	5.33	5.38	5.48	12.10	2.17
29	6.12	5.33	5.37	5.49	1.16	3.10
30	6.11	5.34	5.35	5.49	2.22	3.54
31	6.10	5.34			3.26	

Phases of the Moon, Occultations, &c.

5 Aug.	●	New Moon	1 40 p.m.
12 „	(	First Quarter	4 0 p.m.
20 „	○	Full Moon	7 42 p.m.
28 „	)	Last Quarter	6 0 a.m.

Perigee, 4th August, at 7.12 a.m.
Apogee, 16th August, at 1.0 p.m.

The ringed planet Saturn will be at its highest point in the sky, nearly overhead in Queensland, about 9 p.m., at the beginning of the month. Towards the end it will be about one third of its way downward to the west, followed by the fine constellation Sagittarius. Saturn's rings are nearly at their best.

On the 15th at 3 p.m. the Moon will be passing 4 degrees to the southward of Saturn. This should afford another interesting daylight spectacle for keen eyes, though binoculars or telescope will aid in seeing Saturn. The Moon will pass nearly directly overhead at Brisbane at an early hour after sunset on this and the following night.

The occultation of Phi Sagittarii, magnitude 3.3, will take place on the night of the 16th, about half-past 8 at Brisbane, Toowoomba, and Warwick, but somewhat earlier at Townsville.

When the Moon rises on the night of the 28th it will be interesting to notice the proximity of the planet Jupiter which will be to the northward. Its brightness will exceed that of Sirius, the finest fixed star, which will rise in the south-east about half-an-hour later.

During this month the Southern Cross will be on its downward path towards the west during the evening hours. It will reach its extreme western point about 10 p.m. on the 1st, and about 8 p.m. on the 31st, and being horizontal it will be at a height above the horizon equal to the latitude of the place where the observer is situated.

3 Sept.	●	New Moon	9 47 p.m.
11 „	(	First Quarter	8 47 a.m.
19 „	○	Full Moon	9 16 a.m.
26 „	)	Last Quarter	12 7 a.m.

Apogee, 13th Sept., at 5·18 a.m.
Perigee, 28th Sept., at 10.42 a.m.

The conjunction of the two planets Mercury and Mars will form an interesting spectacle on the evening of the 10th when they will be visible well over the western horizon after the Sun has set, wherever no clouds intervene. Mercury will be 3 degrees (one half the length of the Southern Cross) southward or to the left of Mars.

The nearness of the Moon and Saturn on the evening of the 11th will be an interesting observation. As they approach the western horizon at a late hour the apparent nearness will increase until the distance between them will be only eight times the diameter of the Moon. The Moon will pass on the south side of the planet and next evening at eight o'clock will be 12 degrees, or twice the length of the Southern Cross, to the eastward of Saturn.

On the 23rd the Sun will enter the Sign Libra but not that constellation; it will remain, apparently, in the constellation Virgo.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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QUEENSLAND AGRICULTURAL JOURNAL

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Event and Comment.

The Brisbane Show.

SPEAKING at one of the official functions of Exhibition week, His Excellency the Governor-General, Lord Stonehaven, said that the Brisbane Show played an invaluable part year by year in helping the producer, and in doing that it carried out precisely the work which the Royal Agricultural Society is doing in Britain. That society had been incorporated only in 1840, and it was universally admitted that the immense improvement in the breeding of stock and the standard of agricultural products had been greatly stimulated by its work and influence. It had encouraged the formation of other societies throughout the old country in exactly the same way as the Royal National Association of Queensland had done, and it had set up a standard that had led to an improvement nothing else could have achieved. And the parallel did not cease there. It afforded scope for the carrying out of a tradition which had existed for many centuries in the old country, that the ownership of land involves the discharge of a great deal of onerous unpaid work. When he thought of Mr. Baynes and of his colleagues on the council of the National Association, and the splendid work they were doing for the State of Queensland, for Australia, and for the Empire, he felt they were fully entitled to the proud privilege of carrying on those British traditions. And even that was not the end of the parallel. It had been claimed for the Royal Agricultural Society that it encouraged practical farming on sound scientific principles. In these days of efficiency nothing but the best was good enough, and that was what the Royal National Association of Queensland, following the same lines as the Royal Agricultural Society of Britain, was helping this State and the Commonwealth to achieve.

A Problem to Solve.

CONTINUING, Lord Stonehaven said that the next stage to be reached was really one outside the scope of such associations. When he saw such excellent products as were displayed at their shows—tropical fruits and other products—and realised that they could not produce enough of them to supply the demand, it was evident to him that they had a problem to solve. He looked forward to the day when they would make as big and as concentrated an effort on the packing, shipping, and the marketing of their products as they now were concentrating on the producing of them.

The Position of the Commonwealth—An Optimistic Outlook.

LORD STONEHAVEN went on to say that if they read the newspapers they would come to the conclusion that Australia was passing through a bad time. Now, he would suggest to them that that was only true in a relative sense. The latest available figures showed that Australia last year had 106,115,100 sheep, or 10,000,000 more than the average of the last six years, and from that it would appear that the wool industry was not in a really bad position. Then there was a good deal heard about a drop in the price of wool. He had read that it was estimated that the clip for 1929-30 was likely to be 100,000 bales less than last year, and the same industrious people who had worked out those figures said that if the price remained the same as it was at the end of last season the value of the clip would be £3,000,000 less than the average for the last five or six years, which was £53,000,000. But even with that reduction it would be more than £20,000,000 above what it was before the war. So, although there certainly had been a drop in the price of wool, he would suggest that there was no cause for pessimism, and that the optimistic view which had been taken by representative men who had come from overseas to investigate conditions in Australia was fully justified. There were other points that might be regarded as distinctly cheering. The exports of Australian mutton and lamb last year, for instance, were 85 per cent. in value higher than in the previous year. The exports of beef were 22 per cent. higher, and of butter and cheese 10 per cent. higher. Australia exported £20,000,000 worth more wheat last year than in the year before, the crop being the third largest in the history of the Commonwealth, and the value of the wheat exported was 40 per cent. more than that of the previous year. When they read figures that seemed to be depressing, he hoped they would take into consideration the more cheering points to which he had referred. It must be remembered that there was no industry in which more ups and downs were experienced than that of the pastoralist or the farmer, and, taking all things into consideration, there was no room for gloom or depression, because things were not so bad to-day as they were a few years ago.

The Call of Country Life.

AT the same function His Excellency the State Governor, Sir John Goodwin, said it was always a delight both to Lady Goodwin and himself to attend the Brisbane Show. They both learned a great deal from what they saw there, and it was a keen pleasure to them to meet their friends, old and young, from all over the country. All his life he had been devoted to the land and to the work of the farmer; but unfortunately his duties had taken him abroad, and his work in the army had prevented him from seeing as much of it as he would have liked to do. With regard to the dairy cattle and the exhibit in the meat hall, he would say without hesitation that they compared favourably with anything that could be seen in any part of the world. The district and family exhibits he had always considered to be very valuable indeed. He saw one exhibit on the previous day the exhibitor of which had been second for seven years in succession, but this year he had come out on top. That was typical of Queensland and its people—to go on trying until finally victory was attained. He regarded the annual shows as especially valuable from an educational point of view and for the encouragement given to science. Its educational value indeed was beyond all words. He had been greatly interested in the farm boys' camp, in which twenty-seven boys from all parts of the State were taking part and showing themselves most eager to work and to learn all they possibly could. He was pleased to find that the boys were students from Gatton College and undergraduates from the University.

Our Reliance on Rural Industry.

THE Premier, Hon. A. E. Moore, met with a rousing reception on the same occasion. He said he thought he had made it quite clear in his public utterances for some time past that he considered that the progress and prosperity of Queensland was dependent to a very great extent on the industry and enterprise of its rural population. Consequently, he thought any association that was doing what was in its power to stimulate and encourage the producer in his work was rendering a real service to the community.

The farmer also who produced seed which would yield better crops was serving a like good purpose. Not only were they reaping a benefit for themselves, but, by distributing that better stock or better seed throughout the length and breadth of Queensland, their action must have an ever-widening effect for the benefit of all. The National Association was doing splendid work in giving encouragement to such enterprise.

It had been said by people who should know that if the knowledge already gained could only be made of general application it should be possible, by the top-dressing of the pastures, to increase the productive capacity of the pastoral lands. By such means as this, by the use of licks as an adjunct to the stock foods, and by the application of other scientific discoveries the wealth of Australia would be doubled. The Royal National Association was putting forward the results attained by the few with the object of encouraging the many to follow the good example set.

So far as the Government was concerned, he did not think it could be better employed than in encouraging scientific research for the combating of pests and for increasing the productive capacity of the land generally.

The Council of Agriculture—Lessons of Farmer Organisation.

THE Minister of Agriculture and Stock, Hon. Harry F. Walker, was elected unanimously to the presidency of the Council of Agriculture at its recent annual meeting. On taking the chair, Mr. Walker expressed his appreciation of the action of the Council of Agriculture in electing him as its president. He regarded the occupancy of the presidential chair as an honour accorded to him by farmer leaders with whom he had been associated for many years. There were three reasons particularly which led him to especially value the honour, and they were, firstly, because he was a farmer himself; secondly, because he had learnt the value of co-operative organisation in the hard school of experience; and thirdly, because, as Minister of Agriculture, he realised the value of personal contact with the representatives of the producers in the study of their problems.

As a farmer, he knew the difficulties attendant upon any phase of primary production. He had personally experienced all that is entailed in the carving of a holding out of the bush—the climatic diversity and perversity, the disappointments, the marketing complexities and perplexities, and all that is involved in the life of the man on the land. Because of that experience he would always be able to understand the viewpoint of the individual farmer, and welcomed the opportunity of service which direct association with their organisation would give him.

As a dairyman and as one who held the chairmanship of one of the leading co-operative dairy companies for many years, he understood the value of co-operative organisation. He had taken part in its preliminary organisation, which was followed by the successful establishment of a large manufacturing plant; and afterwards it was his privilege to join in the binding together of the co-operative factories themselves. The work of the Co-operative Dairy Companies' Association thus formed, and of the Butter Pool and of the Paterson Stabilisation Committee, had only to be mentioned to a gathering of producers to bring about a realisation of what their activities had meant in pounds, shillings, and pence to the dairymen. Similarly, in other branches of rural industry many instances could be given of the value of co-operative combination. Inasmuch as he had been associated with co-operative enterprise in the past, he hoped to be able to continue to place whatever influence he possessed on the side of any co-operative organisation formed and controlled by farmers. He had been given an assurance that the activities of the several units of the Queensland Producers' Association, of which the Council of Agriculture is the executive body, are of a strictly non-political character. He had also been assured that the organisation is functioning along co-operative and economic rather than political lines. He hoped the organisation would remain non-political always, and his acceptance of the position of president had therefore no political significance.

As Minister of Agriculture, he knew how necessary it was to establish close contact with the farmers and the associations they had established for their protection and betterment. He felt that his position of President of the Council of Agriculture would assist him in maintaining that contact. With an understanding of the actual view of the man on the land regarding some of his problems, he hoped to be able to deal with any aspect of those problems presented to him as Minister intelligently and sympathetically, and in that way continue the goodwill between himself and his Department on the one hand and the farmers and their organisations on the other.

Bureau of Sugar Experiment Stations.

ENTOMOLOGIST'S ADVICE TO CANEGROWERS.

By EDMUND JARVIS.

The common cane pests in evidence during this month are usually limited to the "weevil borer," termites (white ants), army worms, and grasshoppers.

The "Weevil Borer" or "Cane Borer."

Unfortunately, this insect is, perhaps, only too well known to many of our growers. It is a slender, dark-brownish, reddish-brown, or dark-grey coloured beetle about three-quarters of an inch long, having its head produced into a prominent beak-like snout. Although able to fly well during nightfall, its movements by day, when cut out of a cane stick, are always slow and clumsy, and upon falling to the ground it will often sham death for several seconds before trying to crawl under cover. Signs of its presence in a cane stick are indicated by clearly cut small holes or fissures in the rind; these being found mostly at the basal portion of canes, although in cases of severe attack the tunnels and holes made by these weevils may extend, more or less, throughout the affected stick.

Artificial methods of fighting them are trapping or collecting the beetles, trashing the cane to admit more wind and light, &c. Happily, however, a more simple remedy has been found by enlisting the services of a natural parasitic enemy which destroys the grub or larval form of this pest.

These useful flies will be liberated by officers of the Sugar Bureau, free of cost, on plantations harbouring weevil borers. Application for a consignment of such parasites should be made to the Entomologist at Meringa Experiment Station, near Cairns.

Termites or "White Ants."

Growers north of Townsville occasionally meet with white ants eating their cane setts or nesting amongst the roots of old ratoons. Such trouble, as a rule, only occurs on newly-cleared land planted for the first time. Fumigation of the affected soil with carbon bisulphide, and of any subterranean nests or conical anthills chancing to exist in the immediate vicinity with ordinary benzine, can be recommended as being suitable remedies.

"Army Worms" or "Caterpillar Plague."

Little trouble is likely to arise from the activities of this moth pest until the end of the present month (September). Growers should, nevertheless, keep a sharp lookout for indications of damage to their young ratoons or plant cane by leaf-eating caterpillars, with a view to preventing entire destruction of the foliage. This Experiment Station is now provided with very efficient spraying apparatus, suitable for combating any species of "grass caterpillars," "army worms," or leaf-eating beetles, &c. Timely notice should be made to the Entomologist of all outbreaks of such nature which may occur here, in order that remedial measures may be undertaken with the least possible delay.

DISEASE SURVEY IN PROSERPINE DISTRICT.

The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has received the following report (20th August, 1929) from the Pathologist, Mr. A. F. Bell:—

The Division of Pathology is now carrying out a disease survey of the Proserpine district. A total of 112 farms has been inspected, and the survey completed in the Breadalbane, Glen Isla, Waterson, and Banana Pocket sections, and practically completed in the Up River and Hamilton Plains sections. In general, the disease situation is satisfactory, except for the large amount of Mosaic on the farms in the Proserpine River district. This disease was found on the majority (43) of the farms in the neighbourhood of the river; the percentage infection is highest in the fields right on the river bank, and decreases as the distance from the river becomes greater. Mosaic was also found on three or four farms at Banana Pocket, and is known to occur to some extent at Conroy.

Mosaic disease is the most common of the important cane diseases of the world, and in the past twenty years has been responsible for disastrous losses in a number of countries. It is spread from plant to plant by an aphis which lives on corn, sorghum, &c., and a number of wild grasses. The spread is rapid close to the river bank on account of the large amount of grass there providing a favourable breeding ground for the aphis. The main measures to be adopted for the control of Mosaic disease are (1) The careful selection of disease free cane for planting purposes; (2) careful inspection of the plant cane and the uprooting of any diseased stools found; and (3) cultivation to keep the fields as free from grass and weeds as possible.

Red Rot is also common throughout Proserpine, especially in the variety H.Q. 426. This disease may be controlled in part by the selection of seed, and any sets showing a red discolouration should not be planted.

Downy Mildew, or leaf stripe, was found in one field of B. 208. This variety is very susceptible to both Mosaic and Downy Mildew, and should not be planted except on the advice of the officers of this Bureau.

The selection of seed cane is one of the most important aspects of canegrowing and should be carried out by the farmer himself. In the case of Mosaic, when infection is light seed selection is a simple matter, but when the percentage infection is over about 5 per cent. the seed cane should be purchased from a disease free farm.

For the purposes of ensuring a supply of disease-free cane for planting purposes, the value of the farm nursery cannot be over-estimated. The farm nursery should be planted up each time with disease-free cane, and the resultant plant cane should be inspected frequently, and any suspicious stools removed. The nursery should be kept free from weeds and given the best possible tillage and fertilisation. If the nursery is removed some distance from the rest of the farm so much the better. A plan for the layout of a farm nursery and propagation field is given in the "Queensland Agricultural Journal" for June, 1929 (page 400).

Any farmers desirous of purchasing cane for plants are advised to get in touch with the Cane Inspector or the Secretary of the Canegrowers' Association, as the Bureau has furnished these officials with lists of the farms on which least disease was found.

CANE PESTS AND DISEASES.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following report (6th August, 1929) from Mr. A. N. Burns, Assistant Entomologist, Mackay:

The Golden Beetle (*Calloodes mastersi* Macleay), in the Mackay District.

This rather showy beetle is recorded as ranging from the Ingham district to somewhere about St. Lawrence; it is, however, very plentiful in some seasons in parts of the Mackay district, also on the Lower Burdekin, and often very abundant around Ingham. Some years ago in the area round the Macknade Mill (Ingham) they were collected by beetle gatherers and paid for by the Local Pest Destruction Board, at the rate of 1s. 6d. per quart, but at that time and until quite recently there was no actual evidence that their grubs attacked cane roots.

In the Ingham area the beetles are recorded as feeding on the leaves of bamboos and the introduced "pink burr" which is so plentiful along cane headlands, roadways, &c. In the Ayr district their favourite feeding-tree appears to be a large-leaved, soft-wooded tree or shrub which much resembles the wild tree hibiscus (*H. tiliaceus*), whilst in the Mackay district their feeding-tree is the prickly cork tree (*Erythrina verspatilia*), sometimes called the "bat-wing" leaved tree on account of the peculiar shape of the leaves, which somewhat resemble a bat with its wings half expanded. As far as the writer has observed, this tree appears to be the only feeding-tree of this beetle in this district. The beetles sometimes occur so plentifully as to completely defoliate one of these trees in the course of a few days. Normally the beetles fly about Christmas time, and during the past season they were in full flight by the 24th December, 1928, and they remained in evidence till the middle of January.

Habits of the Beetles.

These beetles appear to revel in sunshine, for, when watched on one of their feeding-trees where they were in hundreds, they were in a state of constant activity whilst the sun shone, and were flying from twig to twig, but if the sun became obscured by a cloud, they quietened down considerably. They are rapid and voracious feeders; one of the trees that was under observation was about 14 feet high, with dense and fairly spreading foliage, and it was completely denuded of leaves within a few days. Mating takes place in the daytime on the feeding-trees, the male resting on the back of the female. This act apparently takes some time, because many pairs thus observed remained so during the whole period of observation, which was considerably over half an hour. Any sudden jar or movement of the twigs or leaves causes the beetles to take to wing; they however soon settle again and recommence feeding. They do not appear to be readily attracted to artificial lights, as only occasional examples flew to light whilst collecting beetles with a lantern, and these were invariably males. An odd specimen could sometimes be collected from under the electric lights at the street intersections.

That the grubs of this beetle attack cane has been definitely proved by the writer during both the 1928 and the present season. Whilst making a grub survey at Mount Jukes on 22nd February, 1928, grubs were obtained at cane roots. At first they were thought to be grubs of the Pentodon beetle, but when taken to the Laboratory and bred through, proved to be those of the Golden beetle. Grubs are at present being bred at the Laboratory, and are feeding freely on cane sets and roots; the nature of the injury is very similar to that occasioned by grubs of the Christmas beetle (*A. boisduvali* Bsd.). These grubs appear to favour fairly heavy scrub soils; where they were collected at Mount Jukes the cane was growing in rich scrub land. At the Laboratory also grubs in cages containing heavy soil appeared healthier and grew faster than those caged in sandy soil.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following report (16th August, 1929) from the Assistant Entomologist at Mackay, Mr. A. N. Burns, for the month ended 12th August:—

Bandicoots in Canefields.

Whilst making inspections of cane farms for insect pests, farmers frequently ask the question "Is the bandicoot a friend or an enemy?" Many growers hold differences of opinion regarding this point. It is true that in almost every canefield there are indications of their excavations at cane stools, but these diggings are invariably greatest and most numerous in patches of cane where grubs are prevalent.

Growers are often of the opinion that the exposure of the cane roots and partial undermining of the stools tends to cause withering of the cane, and, in extreme instances, to lose its anchorage with the soil, and thus fall over. The latter condition would, in the writer's opinion, be hardly possible without the assistance of grubs, when the roots that were not exposed through the bandicoots' diggings would also be destroyed. No doubt several holes made round a stool by these animals would tend to allow moisture to evaporate away from the roots.

The diet of the bandicoot appears to be very varied, perhaps some roots are eaten whilst the animal is excavating at a stool, but the amount of injury thus caused would probably ensue as a result of grub injury; therefore, if the bandicoot destroys two or even one grub at each stool, the good done by the destruction of those grubs at least compensates for the amount of root injury done. On the other hand, there are many growers who regard the bandicoot only as a friend, their explanations for this being that the only places on their farms where the work of these animals occurs is in the patches that are attacked by grubs. In the experience of the writer, certainly by far the greatest number of "excavated stools" has been observed in areas where grubs were attacking the cane. These animals are said to be possessed with a very keen sense of smell, which enables them to locate the presence of grubs in the soil.

The following extract from Bulletin No. 13, 1921, Bureau of Sugar Experiment Stations, gives the following remarks with regard to the stomach contents of a bandicoot. A specimen was dissected and the stomach contents examined; these contained "a cutworm larva, five unknown caterpillars, four locusts (winged grasshoppers), one centipede, two large and eight small spiders, two slugs, a small beetle, many small ants, three large ants, eight large crickets and six small ones, sixteen legless beetle grubs, similar to those of the cane beetle borer or New Guinea borer, numerous portions of ground beetles, and remains of other insects. Some portions of vegetable matter were found as well; these included a piece of bark, three small roots, a couple of bits of grass, two leaves of some weed, and a small piece of dry stick.''

It is quite possible that the bark, leaves, and wood were eaten with the insects—perhaps swallowed by accident—whilst the bandicoot was foraging for insect foods.

It may be seen from this examination that the majority of the stomach contents was insectivorous; this particular examination, too, it is recorded, was made at the time of year (July) when insects are comparatively scarce.

In June and July cane grubs, both of the greyback and Frenchi beetles, burrow downwards to form their pupal or resting cells. This would likely account for no grup remains being discovered in the stomach contents that were examined. In the same Bulletin (No. 13, 1921) reference is made to examinations made of the stomach contents of bandicoots during the month of March when cane grubs are always prevalent. This further record states—''These examinations showed a strong preference for this pest (i.e., cane grubs), because the stomach contents were usually well supplied with the chitinous (heads) remains of cane grubs, and no plant tissues.''

Bandicoots in Victoria frequently dig holes into rotten logs and stumps, or round the roots of very old and rotten trees, in the search for beetle grubs which are plentiful during the spring and summer months in such situations. The writer has also occasionally observed their excavations in the large nests of some of the large sugar ants (Campanotinæ) and bulldog ants (Myrmecinæ).

It is really only during a great scarcity of insects that bandicoots might partake of any appreciable amount of vegetable food; but in a sub-tropical or tropical climate such as exists in the Queensland canegrowing areas, insects of some kind are always more or less plentiful at every month of the year, therefore the good done by these animals may assuredly be considered in excess over the destruction sometimes attributed to them.

Large Moth Borer (*Phragmatiphila truncata* Walk.)—Injury to Mature Cane.

Several inquiries have recently come to hand from farmers who were engaged in cutting plants, of ''ring necked sticks,'' the ring neck or borer tunnel round the stick usually occurring just above or below the nodes. Tunnelling may also occur in the internodes, but in these situations it is usually longitudinal instead of horizontal.

The softer varieties of cane such as H.Q. 426 (Clark's Seedling) and B. 208 are particularly susceptible to attack from these borers, and inspections made during the past month on farms where these varieties were growing revealed in one or two instances appreciable injury. It is usually the outer cane rows adjoining the headlands or fences that are subjected to the worst attack. Other varieties of cane are also injured by these borers, but not to nearly so great an extent as the two abovenamed varieties.

When cutting cane for plants care should be exercised to exclude any ''bored plants'' as these would possibly not strike, but would simply rot or ferment in the ground as a result of the damage caused to their tissues.

At this time of year practically all the injury done to cane by these caterpillars is confined to the mature sticks; now that cutting has commenced and young ratoons will soon be appearing, growers should keep a lookout for the appearance of ''dead hearts'' in the young cane shoots. As a rule, young plant cane does not appear to be quite so seriously attacked as ratoons, though it often suffers considerable damage. The reason that young ratoons are slightly more susceptible to injury from these borers is owing to the fact that the point of entry of the caterpillar into the shoot is usually in the side and near the basal portion of the shoot; in plant cane this part is mostly between the ground surface and the point of attachment with the set, whereas in ratoons considerably more of the lower parts of the shoots are exposed or aboveground.

Natural parasites—the principal one of which is a minute Braconid wasp—that infest the caterpillar stage of this insect, do not apparently exert much control as shown by breeding out a large number of specimens at the laboratory last year. The examples that were kept under observation were collected from a field of H.Q. 426 first ratoons, where the percentage of attacked shoots in three particular rows was estimated to be 70 per cent. No parasites emerged from the caterpillars collected from these rows.

The earliest indications of the presence of moth borer caterpillars in young shoots is a shrivelling of the central folded leaves, followed by a wilting and complete dying. When dead, if pulled gently these central shoots will come away, and if examined the lower part will be seen to be eaten through and rotten. It frequently emits an offensive odour, and often little whitish maggots may be seen in the rotten material. These are not the borer caterpillars, but are purely secondary in their occurrence; they are the maggots or larvæ of small flies which breed in decaying vegetable matter.

The most practical method of controlling moth borers is to cut out from as near as possible to the point of attachment with the stool any shoots which show indications of shrivelling or wilting in the central leaves. If cutting these is delayed until the centre leaves are quite dead, the cutting out of such shoots at so advanced a stage is useless, because the borer caterpillar will have left and entered into a fresh shoot. One caterpillar may account for a number of shoots, and will not necessarily confine its attacks to one stool only.

The fully-grown borer measures from 1⅛ inch to 1¼ inch in length, and is of a light pinkish or purplish brown colour on the back and sides. It is pale greyish or pinkish on the central or under surface. A complete description of its life history and habits in the Mackay district was detailed in the entomological report of this station for the month of May last year.

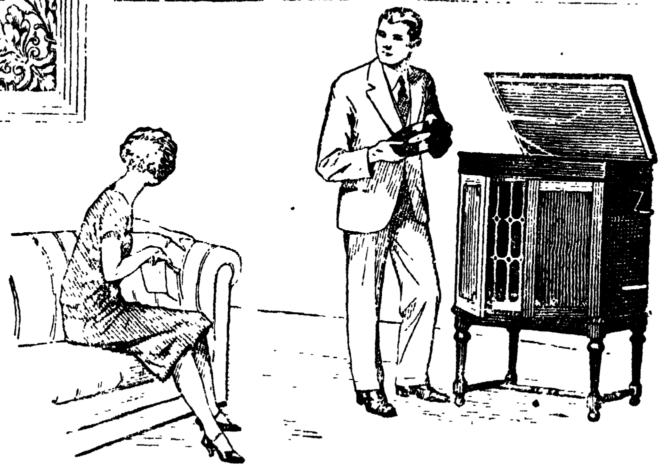
RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF JULY IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING JULY, 1929, AND 1928, FOR COMPARISON.

Divisions and Stations.	Average Rainfall. July.	Average Rainfall. No. of Years' Records.	Total Rainfall. July, 1929.	Total Rainfall. July, 1928.
North Coast.	In.		In.	In.
Atherton	1·00	28	0·52	2·23
Cairns	1·58	47	0·46	1·50
Cardwell	1·38	57	0·18	0·64
Cooktown	0·99	53	0·54	0·26
Herberton	0·79	42	0·29	2·58
Ingham	1·54	37	0·50	0·73
Innisfail	4·72	48	1·49	5·15
Mossman	1·39	16	0·03	0·86
Townsville	0·61	58	0·06	0·02
Central Coast.				
Ayr	0·72	42	0	0
Bowen	0·94	58	0·66	0·08
Charters Towers ..	0·66	47	0·	0·09
Mackay	1·67	58	0·22	0·05
Proserpine	1·36	26	0·05	0·55
St. Lawrence.. ..	1·30	58	0·02	0·09
South Coast.				
Biggenden	1·38	30	0·12	0·64
Bundaberg	1·85	46	0·04	0·96
Brisbane	2·24	78	0·53	0·72
Caboolture	2·20	42	0·32	1·04
Childers	1·73	34	0·04	0·67
Crohamhurst ..	2·94	36	0·32	1·43
Esk	1·98	42	1·19	1·50
Gayndah	1·47	58	0·05	0·67
Gympie	2·16	59	0·55	1·39
Kilkivan	1·64	50	0·39	0·80
Maryborough ..	1·60	57	0·03	1·20
South Coast—continued :				
Nambour	2·78	33	0·30	1·02
Nanango	1·70	47	0·25	0·84
Rockhampton ..	1·45	42	0	0·30
Woodford	2·11	42	0·38	1·38
Darling Downs.				
Dalby	1·73	59	0·57	1·18
Emu Vale	1·57	33	0·57	2·07
Jimbour	1·58	41	0·35	1·32
Miles	1·67	44	0·39	2·15
Stanthorpe	2·05	56	1·11	2·54
Toowoomba ..	2·04	57	0·69	1·61
Warwick	1·82	64	0·76	1·84
Maranoa.				
Roma .. .	1·45	55	0·19	0·82
State Farms, &c.				
Bungeworgorai ..	1·43	15	0·06	0·50
Gatton College ..	1·34	30	0·65	0·79
Gindie	0·95	30	0	0·23
Hermitage	1·72	23	0·76	1·65
Kairi	1·20	15	..	1·21
Mackay Sugar Experiment Station ..	1·46	32	0·16	0
Warren	1·20	14	0	..

GEORGE G. BOND,

Divisional Meteorologist.



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	£	s.	d.	£	s.	d.
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Sulphate Ammonia, f.o.r. Brisbane ..	18	10	0	16	5	0
Sulphate Ammonia, f.o.r. Townsville ..	19	0	0	17	0	0
Nitrate of Soda, f.o.r. Brisbane	17	0	0	16	0	0
B3 (now with increased Potash content), f.o.r. Brisbane	14	2	6	13	15	0
Howes' Mixture, f.o.r. Brisbane ..	16	10	0	15	2	6
Shirleys No. 5, f.o.r. Brisbane	10	15	0	10	5	0
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PESTS OF BANANAS.*

By ROBERT VEITCH, B.Sc., F.E.S., Chief Entomologist.

Banana-growing in Queensland is unfortunately probably more handicapped by the incidence of pests and diseases than any other branch of fruit culture in this State. The entomologist has to handle such extremely serious and difficult pests as the banana weevil borer and the banana thrips; less serious but still important sources of loss that come within his province are such pests as the fruit-spotting bugs, fruit-eating caterpillars, and the banana fruit fly. There are quite a number of other insect enemies of the banana, but they are all, at least at present, of trifling importance to the grower, and reference need not be made to them in these notes, except in the case of the banana aphis. The latter is of no consequence so far as actually weakening the plant by sap-sucking is concerned, but it is of first-class importance as the insect vector of bunchy top.

The banana weevil borer has been the subject of an exhaustive investigation by J. L. Froggatt, and readers who wish to acquaint themselves with all aspects of the borer problem should consult the bulletin prepared by that investigator. Banana thrips has also received considerable attention and a bulletin thereon has been written by Girault, and here again the reader may consult a much more extensive fund of information than can be given within the pages of a handbook such as this. Girault's investigation was followed by further work by Froggatt, dealing more particularly with the question of the field control of the banana thrips.

The Banana Weevil Borer.

The banana weevil borer (*Cosmopolites sordida* Chevr.) is without doubt the most destructive insect enemy of the banana plantations of Queensland. Not only is its attack frequently one of great severity, but there is also every reason for believing that few, if any, districts in this State are free from infestation. The available evidence apparently indicates that this species is not a native of Australia, but it is now a matter of extreme difficulty to indicate with any degree of confidence the native home of this very destructive weevil. It has been recorded from Africa, Australia, Ceylon, Fiji, India, Java, Mauritius, New Hebrides, Philippines, Raratonga, Samoa, South America, and the West Indies.

NATURE OF INJURY.

The damage to the banana plant in the case of this species is caused entirely by the grubs of the weevil borer feeding in the tissue of the attacked plant. (Plant 81.) The grubs hatch from eggs laid by the beetles, and in feeding in the bulb or corm of the banana plant they tunnel through the corm to such an extent, in the case of severe infestations, as to seriously weaken the plant. In its weakened condition both the quantity and quality of the fruit produced by the infested plant are very appreciably reduced, and thus the growers suffer very severe losses. This reduction in yield and quality is particularly noticeable when the plant is growing under unsuitable soil conditions, and is also much in evidence during an unfavourable season characterised by unusually low rainfall.

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*Reprinted from "Pests and Diseases of Queensland Fruits and Vegetables" by Robert Veitch, B.Sc., F.E.S., and J. H. Simmonds, M.Sc., published by the Department of Agriculture and Stock. Brisbane, 1929.

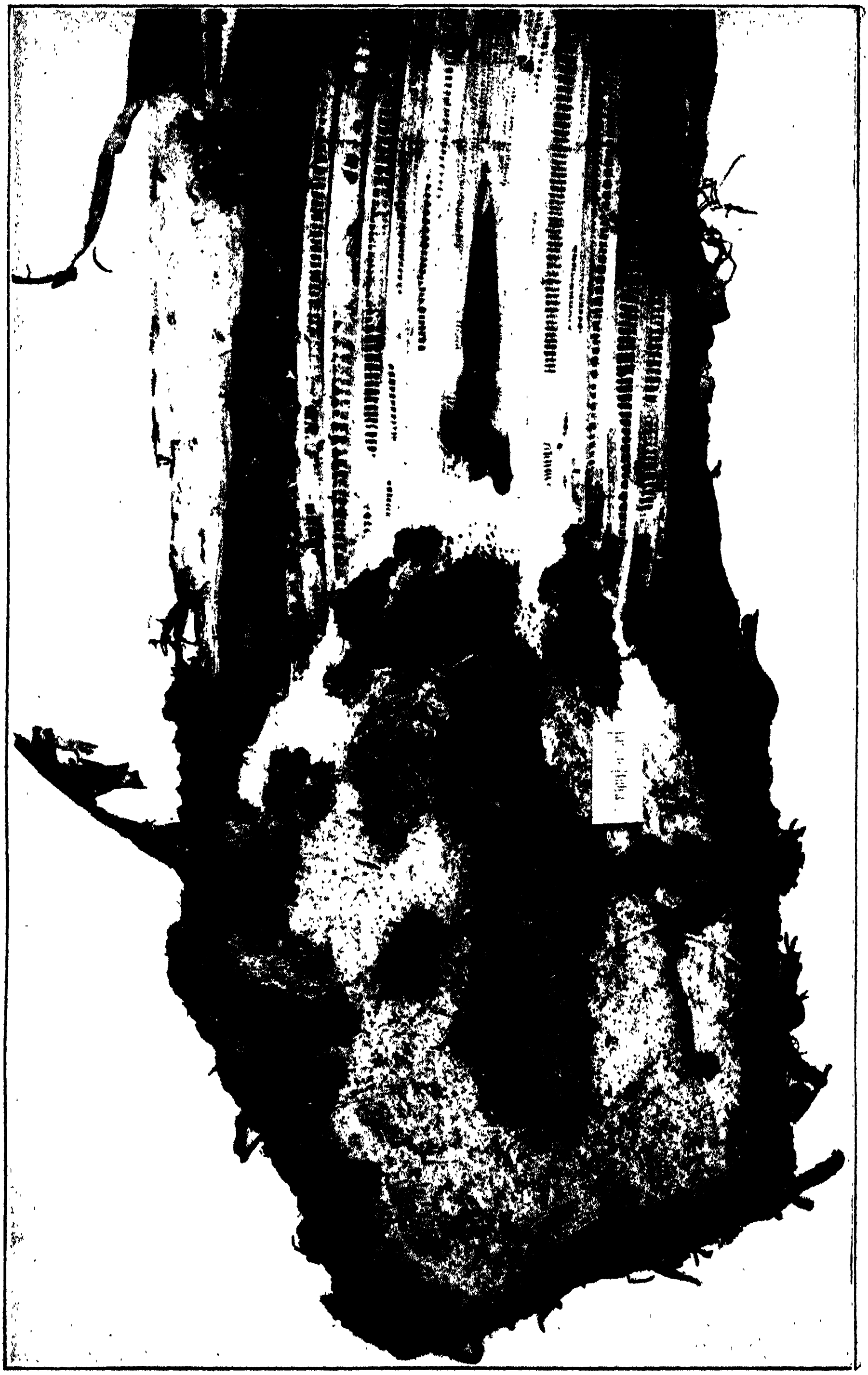


PLATE 81.—BUTT OF BANANA PLANT ATTACKED BY BANANA WEEVIL BORER.

PLANTS ATTACKED.

The banana weevil borer in Queensland has never been found attacking plants other than those belonging to some species of banana. The different varieties of cultivated bananas grown in this State—i.e., Cavendish, Dacca, Gros Michel, Lady's Finger, Plantain, and Sugar—do not appear to differ in any degree with respect to their susceptibility to attack.

LIFE CYCLE STAGES.

The usual four life-cycle stages are met with in this pest—namely, the egg, grub, pupa, and adult. The egg is the stage of incubation, the grub of active feeding and accompanying rapid growth, the pupa of transformation, and the adult of reproduction.

The elongate oval egg (Plate 82, fig. 1) measures roughly $\frac{1}{12}$ inch in length and is pearly white in colour when first laid; as the incubation period advances certain changes, however, can be noted in its colour, but these changes need not be dealt with in the present notes.

The full-grown grub or larva (Plate 82, fig. 2) measures about $\frac{1}{2}$ inch in length and is normally distinctly curved in appearance. It is a somewhat bulky object with a creamy-white body and a reddish-brown head. Other features worthy of mention are the fact that it is legless, and that certain of its body segments are very much swollen, thus giving it the bulky appearance already mentioned.

The pupa (Plate 82, fig. 3) is about the same length as the grub, which it also closely resembles in colour when newly formed. Even a casual examination of this stage of the insect's life cycle will disclose the fact that the wings and legs of the future beetle are distinctly visible in the pupa.

The adult (Plate 82, fig. 4) is a typical weevil possessing a very prominent trunk or proboscis. It is black in colour, measures roughly $\frac{1}{3}$ inch in length, and, like many weevils, its skeleton or outer shell is extremely hard.

LIFE HISTORY AND FEEDING HABITS.

The eggs of this beetle are laid singly, the spot chosen for egg-laying being in the plant at or near ground-level. A small curved chamber is formed in the plant tissue by the female beetle, and therein the pearly-white egg is deposited. The incubation period of the egg varies, but according to Froggatt it may be regarded as averaging eight days during the warmer months of the year; in midwinter, however, the incubation period has been prolonged to as many as thirty-six days.

It is worth while mentioning the fact that egg-laying in the case of this weevil occurs right throughout the year but with varying intensity, the maximum activity in egg-laying being displayed in spring and autumn.

On hatching from the egg the grub commences its career of destruction, and if an infested corm is examined it will frequently be found to be tunnelled through and through, this tunnelling being accompanied by the evil effects already referred to in an earlier paragraph, namely, a serious reduction in the quantity and quality of the fruit produced. This honeycombing of the corm would not, of course, be the work of one grub; as many as thirty-five grubs have been found in a single corm.

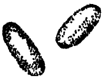


Fig 1.

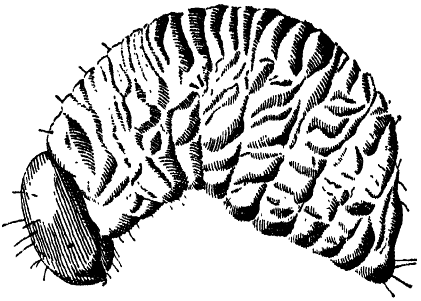


Fig 2.

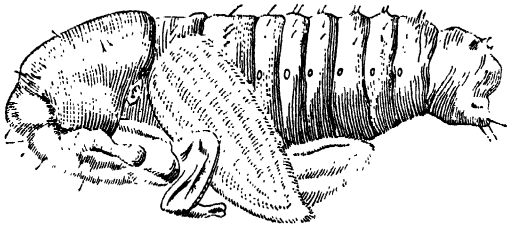


Fig 3.

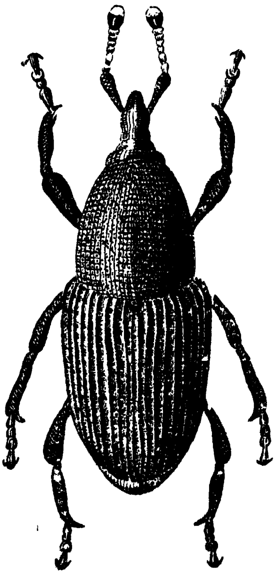


Fig 4.

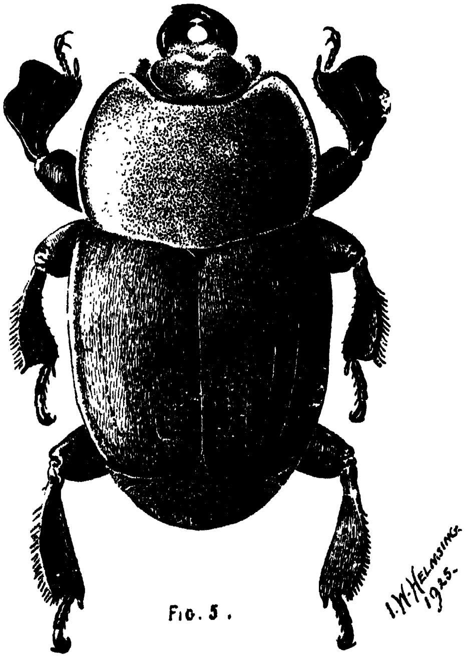


Fig. 5.

I.W. Helmsing 1925.

PLATE 82.—THE BANANA WEEVIL BORER (*Cosmopolites sordida* Chev.).

Fig. 1, Egg. Fig. 2, Larva or Grub. Fig. 3, Pupa. Fig. 4, Adult Borer. Fig 5, Adult of *Plæsius javanus*, predator on the Borer. Magnified 4 diameters.

It has generally been found that, in the case of banana weevil borer infestation, the attack is confined to the underground portion of the plant and to but a few inches above ground-level; however, in cases where the stem has been left standing after the cutting of the bunch that it has thrown, infestation of the stem may be very extensive, and indeed it may be attacked throughout practically its whole length.

The grub continues feeding within the tissue of the plant for some considerable time, the actual duration of this stage, as indeed is the case in all the others, being influenced very greatly by the prevailing temperature. Froggatt has found that in summer growth may be completed in two weeks, whereas in winter quite twenty-three weeks may be required for the completion of this stage in the insect's development. During its period of growth the grub moults several times, moulting being necessitated by the fact that the skin of insects does not grow but will only stretch to a limited extent. When its growth is on the verge of completion the grub diverts its tunnel towards the outside of the corm, so that there may be but a very slight barrier between the newly formed beetle and the outer world.

The grub then transforms to the pupa at the end of its feeding tunnel, and it does so without forming the fibrous cocoon that is so frequently present in this type of beetle. The usual transformation processes take place, and as a result thereof the beetle or weevil appears in a little over a week. Here again there is some considerable variation, for in winter as many as eleven days have been spent in the pupal stage, whereas in summer it has been as short as four.

The period that elapses between the laying of the egg and the emergence of the beetle is somewhere in the vicinity of seven weeks on an average, but, as already indicated in the discussion of the various stages of the life cycle, that figure fluctuates very considerably with such factors as temperature.

The newly formed beetle does not leave the pupal chamber for a few days but remains resting quietly therein hardening and darkening its skeleton, and having done so it then eats its way out into the soil, feeds, mates, and thus reproduces its species and commences a new life cycle.

CONTROL MEASURES.

The life history as outlined above should clearly indicate that there is little hope of successfully employing either sprays or fumigants against this serious pest. All stages in its life cycle, except the weevil itself, are very securely entrenched behind a most effective barrier of plant tissue, and hence in employing artificial control measures attention must be confined to the beetle itself.

In practice it has been found that the beetles are attracted to baits, and it has further been demonstrated that the beetles so attracted will be killed if the baits are dusted with Paris green. If the two operations of trapping and killing are combined in this way, the very laborious business of regularly visiting the baits and killing the beetles that have been attracted thereto will be eliminated.

Suitable baits are supplied by the banana plant itself, and growers wishing to combat this pest by baiting have a choice of several systems.

Portions of the corm may be cut off and placed on the ground either inside or close to the banana stool. The freshly cut surface of the sliced corm is dusted with Paris green, which has previously been diluted with flour at the rate of one part of Paris green to six parts of flour. The slices of corm treated as described are then placed in position with the dusted surface downwards and are covered with trash. The object in covering the baits with trash is partly to produce the degree of darkness that is so attractive to the beetles and partly to prevent unduly rapid drying out of the baits which would thus become relatively unattractive.

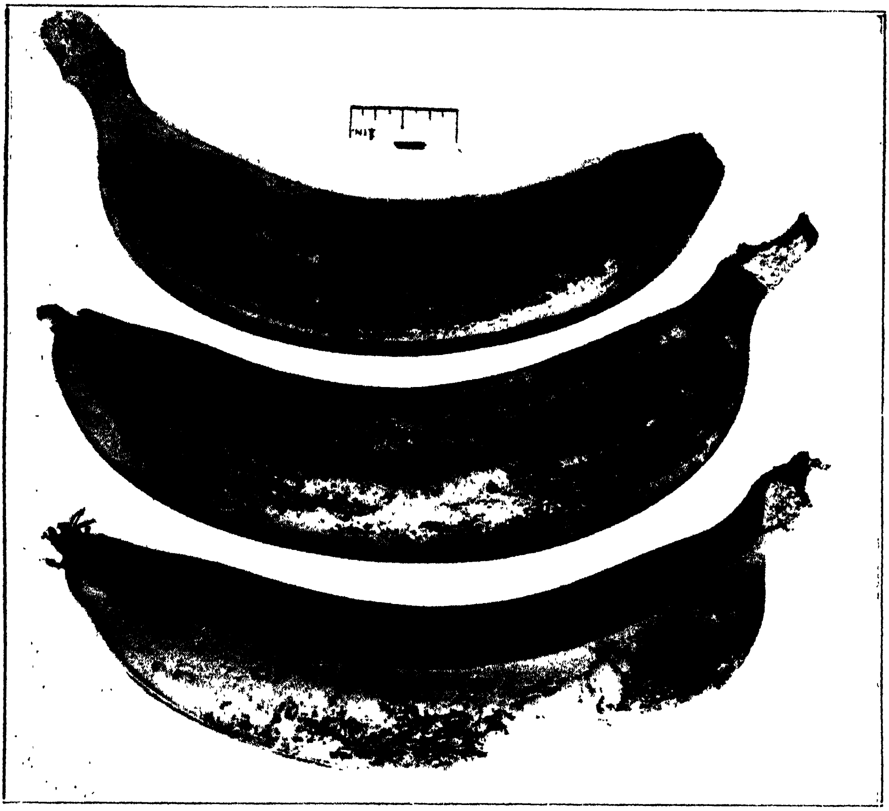


PLATE 83.—BANANA FRUIT SHOWING "RUST" DUE TO THRIPS ATTACK.

A second system that is much in favour consists of cutting out a plug of tissue in old butts by means of the sucker pruning blade. The cavity thus formed is dusted with the poison mixture and the plug is then replaced. The cut surface of the old butt is also dusted.

The third system of baiting is the one that is at present most in favour, and it consists of dusting the freshly cut surface of the old butt after a deep groove has been cut therein by means of a cane-knife. The whole of the cut surface as well as the wedge-shaped piece of tissue removed from the groove is dusted with the poison mixture, and the wedge is then replaced in the groove.

In the experimental work conducted by Froggatt in connection with the control of this pest, numerous poisons were tested out in conjunction with the baits. Very appreciable kills were obtained with quite a number of the substances employed, but it was found that Paris green was the most satisfactory of those handled, firstly because it gave a very high percentage of mortality and secondly because it was very rapid in its effects. Hence the Department strongly recommends its use as the most suitable poison to employ in conjunction with the baits.

Attention has so far been confined to the prospects of controlling this pest by the use of poisoned baits, but that is by no means the only weapon available in the campaign against the banana weevil borer, for strict observance of plantation hygiene will be productive of decidedly beneficial results.

Plantation hygiene necessitates the digging out of badly infested stools. Such stools are no longer profitable, and as they merely serve to intensify infestation their loss will not be felt by the grower. Where a stool is but slightly infested, the treatment required is not nearly so drastic and it will be sufficient if the old corms are removed. These corms should be carefully sliced up into thin pieces and any stems removed should be chopped in half.

Stems from which the bunches have been cut should be chopped off close to the ground, and then split in halves in order to facilitate the rapid drying out and decay of the tissue, which will thus be rendered unattractive to the borer.

PREVENTION OF INFESTATION.

It has been demonstrated that the most frequent means by which new plantations become infested with the banana weevil borer is through the use of infested suckers in planting up such new areas. Infestation may also occur by beetles being carried down in flood waters from higher infested levels to lower uninfested areas, and also by beetles crawling in from an adjacent badly infested plantation. Flight also plays some part in the dispersal of this pest, but it is at present regarded as playing only a very minor part in infestation.

Flight cannot be controlled, and obviously little can be done in dealing with flood waters, hence efforts to prevent infestation or intensification of infestation must be largely confined to dealing with imported suckers and the crawling beetles.

To deal with the possibility of infestation in imported suckers, the following departmental recommendations have been made. Firstly, the digging of suckers or corms should each day be restricted to the quantity that can be planted the following day. Secondly, every corm or bulb that has been dug out should be carefully examined for traces of borer infestation, and it has been found that this is best accomplished by carefully paring off a thin slice of plant tissue. It is desirable that this slice be removed as far up as it is practicable to do so without inflicting injury to the eye. Paring off this thin slice will accomplish a twofold object; firstly it will eliminate any eggs that may have been laid in the corm, and secondly it will expose borer tunnels that may be present. All corms showing the presence of borer tunnels should be destroyed. Finally, having selected the suckers in accordance with the preceding recommendations, these should be placed on a cart or slide and removed to the new area with the least possible delay. If they are allowed to remain overnight in an infested plantation, the precautions of paring

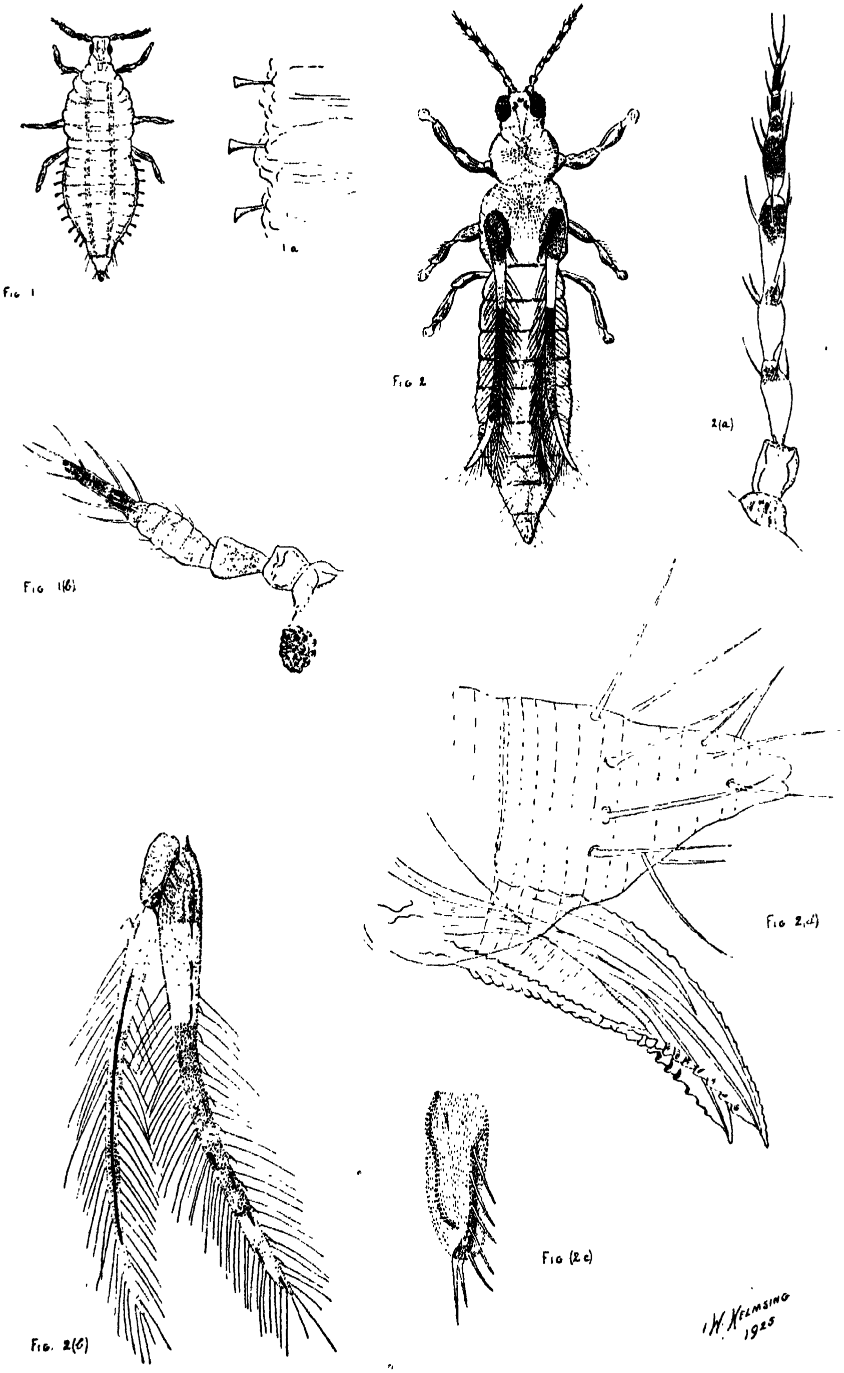


PLATE 84.—THE BANANA THRIPS (*Scirtothrips signipennis* Bagnall).

Fig. 1, Larva, × 45. Fig. 1*a*, Portion of side of abdomen of larva, × 210. Fig. 1*b*, Antenna of larva, × 210. Fig. 2, Adult female, × 45. Fig. 2*a*, Antenna of adult female, × 210. Fig. 2*b*, Wings of female, × 90. Fig. 2*c*, Scale over base of wings, × 180. Fig. 2*d*, Apex of abdomen of female, showing saw-toothed ovipositor, × 295.

and destroying tunnelled corms will in all probability be rendered of little value by reinfestation of the suckers while waiting overnight for removal.

The danger of heavy infestation of clean new areas adjacent to old infested ones is very appreciable, and if such sites have to be selected for new banana plantations it is desirable to lay rows of baits between the new and the old areas, in order to minimise as far as possible the migration of beetles from the one to the other.

The policy to be adopted in the fight against the banana weevil borer may be summarised by saying that the chief objective is firstly to endeavour to keep new areas clean by adopting the precautions already detailed, and secondly, when infestation has occurred, to endeavour to minimise its effects by baiting the beetles with Paris green.

POSSIBILITY OF BIOLOGICAL CONTROL.

The Department of Agriculture and Stock has devoted a considerable amount of attention to the possibility of controlling this pest by the introduction from overseas of some of its natural enemies. Between the years 1921 and 1926 a number of colonies of the predatory Histerid beetle *Plæsius javanus* Er. (Plate 82, fig. 5) were introduced from Java and liberated on suitable plantations in Queensland. Definite evidence of the establishment of that beneficial insect has not yet been obtained.

More recently Froggatt visited Java and inquired into the whole question of the control of the banana weevil borer in that country, paying particular attention to its control by natural enemies. Arising out of that visit, further large colonies of *Plæsius javanus* were imported to Queensland and are at present being handled in captivity in quarantine. Colonies of a predaceous Leptid fly, *Chrysopila ferruginosa* Wied., were also obtained, and after undergoing the usual quarantine period a colony of this beneficial insect was liberated in the Cooran district.

It should be clearly understood that, in the case of this pest, the biological control work is still in the experimental stage, and, even if the two insects just discussed should become permanently established in this State, some considerable time, extending into several years, must elapse before there is any possibility of their becoming sufficiently numerous and widely distributed to appreciably reduce infestation. Growers are therefore urged to continue to carry out the control measures recommended in earlier paragraphs. They can rest assured that, should the present experimental work in biological control show signs of success, they will be immediately advised to that effect.

The Banana Thrips.

The banana thrips (*Scirtothrips signipennis* Bagnall) is a very small and insignificant insect which has for many years been responsible for the serious banana-skin condition known as "rust" or "colour." Centres of infestation occur in various localities in coastal Queensland, from Cairns in the far north to banana-growing districts south of Brisbane. In recent years particularly serious outbreaks have occurred in the Innisfail and Gympie districts.

NATURE OF INJURY.

The term "rust" has been applied to attacked bananas because of the characteristic injury produced by the feeding of the larval and

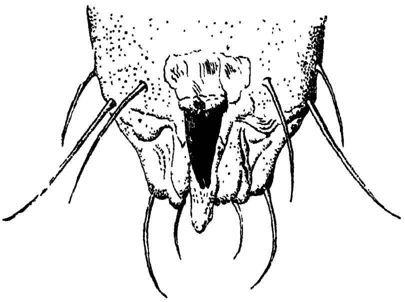


Fig 1 × 225

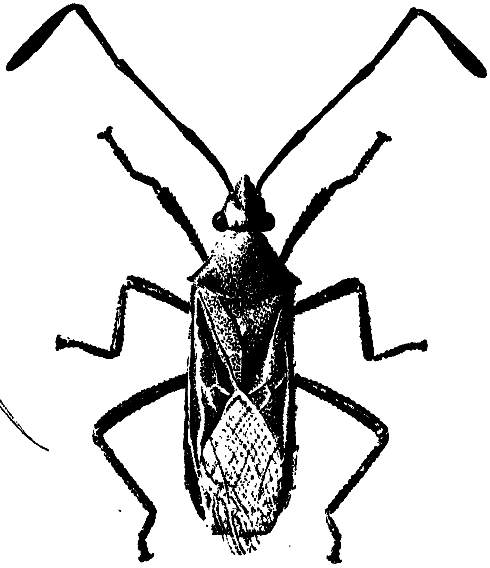
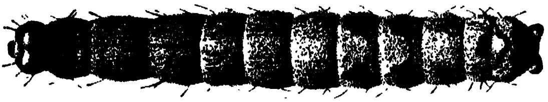


Fig. 2 × 4

Fig 3 × 1½



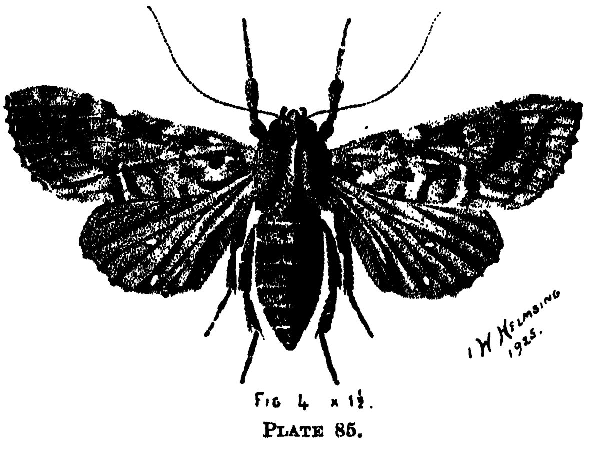

I W Helmsing 1925.

Fig 4 × 1½.

PLATE 85.

Fig. 1, Anal segments of male of *Scirtothrips signipennis* Bagnall, showing genitalia, × 225. Fig. 2, Imago, *Pendulinus fuscescens* Dist., × 4. Fig. 3, Larva, *Tiracola plagiata* Wlk., × 1½. Fig. 4, Imago, *Tiracola plagiata* Wlk., × 1½.

adult thrips on the skin of the fruit. Infestation commences at points of contact on the fingers, particularly at the base of the hand. The injured fruit then acquires a typical reddish-brown appearance with a somewhat roughened surface (Plate 83). This discoloration and roughening of the skin may be confined to a relatively small area at the base of the hand, but in severe attacks it may involve practically the whole of the skin of the fruit. Furthermore the skin may subsequently become quite extensively cracked. Where infestation has not been unduly severe, thrips attack does not render the fruit less palatable, although it undoubtedly gives it a much less attractive appearance and thereby appreciably reduces its market value. When the whole surface of the fruit or the greater part thereof is involved in severe discoloration and roughening, the quality of the fruit is, however, decidedly impaired, and cracked fruit with exposed pulp is obviously unsuitable for marketing.

LIFE CYCLE STAGES AND LIFE HISTORY.

The very small eggs of the thrips are laid in the skin of the fruit, generally in tissue on which colonies of the adults have established themselves where the fruit are touching at the base of the hand. Egg-laying takes place in punctures made by means of the saw-toothed ovipositor with which the female is equipped (Plate 84, fig. 2d.) Eggs are similarly deposited under the leaf-sheaths, where adults also very frequently form colonies. According to the life-history studies carried out by Girault, these eggs hatch after an incubation period of about a fortnight, which is surprisingly long in view of the fact that the duration of the subsequent larval and pupal stages is only about one week in each case.

The larvæ on hatching out feed in colonies in association with the adults, these colonies as already indicated being found beneath the leaf-sheaths and on the fruit at various points of contact. The larvæ become full-grown in about a week and are then about $\frac{1}{25}$ inch in length and are white in colour. They pass through the usual series of moults; a young larva is illustrated on Plate 84 in figure 1.

The full-fed larva pupates either on the plant or in the soil and a week later the winged adult appears (Plate 84, fig. 2). The adult is a delicate yellow insect bearing two pairs of typically fringed wings; in size it is very slightly larger than the full-grown larva.

Thrips infestation may be observed in every month of the year, but it is at its lowest ebb during the winter months. With the approach of warmer weather in September, numbers increase appreciably, and the peak of infestation is reached in January and February.

CONTROL MEASURES.

Before considering the question of the control of this pest when it actually occurs on a plantation, it is perhaps desirable to point out the necessity for taking every precaution to prevent its establishment where that has not already taken place on a plantation. With this object in view, suckers, if they have to be brought in from another plantation, should where possible be obtained from one in which thrips do not occur. Infestation is now, however, so widespread throughout coastal Queensland that it will be difficult indeed to find a "rust"-free plantation from which to draw supplies. Hence most growers will have to obtain their supplies of suckers from infested plantations. When doing so, the soil

PLATE 86.—DAMAGE CAUSED BY FRUIT-SPOTTING BUGS.

on the bulbs should be removed as thoroughly as possible, and they should then be pared so as to remove a thin slice of tissue. Finally the top should be removed as close down as possible. A question that has frequently been raised is the possibility of dipping suckers in a solution that will kill the thrips and thus ensure a supply of clean suckers. There are, however, a number of difficulties which appear to render such a desirable procedure impracticable, at least in the present state of knowledge.

Where infestation occurs attention should be paid to plantation hygiene, and, as in the case of banana weevil borer infestation, stems from which bunches have been cut should be chopped down close to the ground, and then split open to hasten the drying out of the tissue, which will thus cease to be attractive to the thrips for feeding or breeding. The removal and destruction of tip fruits is also desirable for similar reasons. Hoeing in the vicinity of the banana plant will lead to the exposure and destruction of pupæ and newly transformed adult thrips, and will thus be productive of much good.

Finally consideration must be given to the possibility of effectively controlling this pest by the use of insecticides. Pyrethrum powder mixed with sifted wood ashes in equal portions was tested as a dust in the 1924 investigations, 1 lb. of the pyrethrum being sufficient to dust 230 bunches. Girault recommended that the treatment be repeated at least four times at intervals of nine days. In 1926 Froggatt carried out field trials in the Innisfail and the North Coast districts, to test the value of calcium cyanide dust, in the hope of obtaining a more deadly dust with the power of rapidly killing practically the whole thrips population on dusted bunches. A very high percentage of kill was obtained and no damage was done to the treated fruit. Banana-growers in some cases have, however, complained of injury to treated fruit, and accordingly further field trials have recently been instituted to place the insecticidal treatment of this pest on a thoroughly satisfactory basis.

Fruit-spotting Bugs.

In the Byfield section of the Rockhampton district, considerable losses have been caused by the feeding of two species of bugs, namely, *Pendulinus fuscescens* Dist. (Plate 85, fig. 2) and *Pendulinus lutescens* Dist. These Coreid bugs attack the fruit, and as a result very characteristic dark, circular, depressed areas are formed in the vicinity of the feeding punctures on the skin of the injured fruit (Plate 86). At the centre of these depressed areas there is a pronounced raised spot. Fruit at all stages of maturity may be attacked, but the results of the puncturing vary in their intensity. If the fruit is attacked while it is still very small, the skin will generally split across the centre of the depression surrounding the original puncture (Plate 87), and such fruit is obviously of little or no value for marketing. Splitting does not take place when the attack is confined to more mature fruit, and the infestation consequently is not quite so serious in its effects, although it is without doubt at least a serious blemish that renders the fruit unattractive in appearance.

The injury to fruit is inflicted by both the nymphs and the adult bugs, and is most pronounced in late summer and autumn. *Pendulinus lutescens* Dist. is thought by Froggatt to be the more destructive of the two species. It occurs at many centres throughout coastal Queensland,

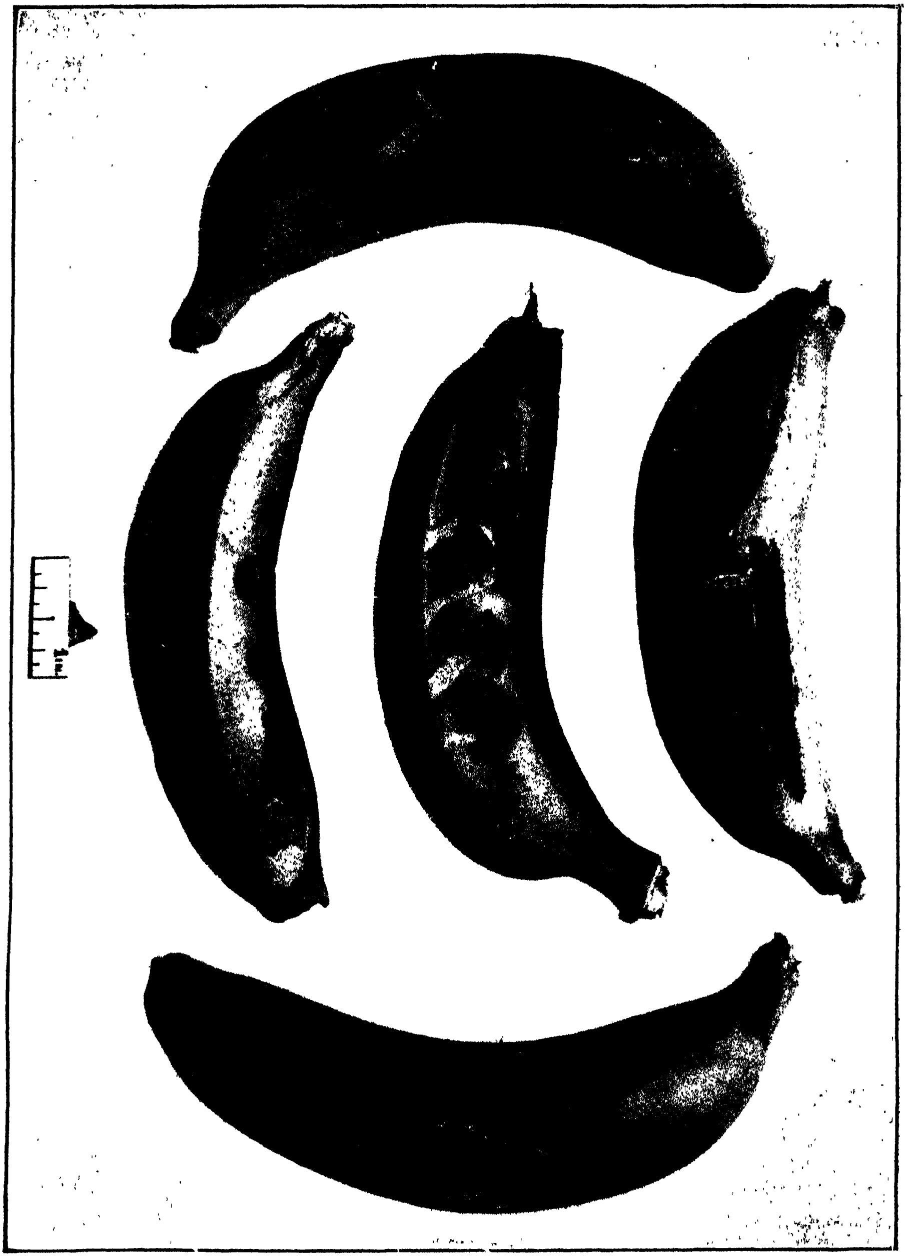


PLATE 87.—DAMAGE CAUSED BY FRUIT-SPOTTING BUGS.

ranging from Cairns in the North to Brisbane in the South. It is therefore rather curious that its destructive activities should have caused concern in only one banana-growing district in the State. Fruit showing apparently identical injury has, however, been seen in small quantities in the Glastonbury section of the Gympie district. It is, of course, impossible to say whether the Glastonbury fruit was attacked by the species now under discussion or by some other bug.

CONTROL MEASURES.

Little definite information can at present be given with respect to the control of these pests, and they should accordingly form the subject of an investigation whenever a suitable opportunity occurs for doing so. Sharply jarring the bunch, over the lower portion of which a bag of mosquito netting has been previously slipped, will cause the immature nymphs to fall into the trap thus formed, and also induce the adults to fly downwards into the netting. The bugs collected in this manner can then be subsequently destroyed, and it may be that such a method of attack will prove sufficiently effective to be economically practicable. In the absence of anything better it is at least worthy of a trial on infested plantations. Any field investigation that is carried out should also test the possibility of successfully using stockinet covers to protect the fruit from attack. Preliminary evidence in favour of this procedure has already been obtained.

Some attention has been given to alternative host plants of these bugs, and when their host relationships are more fully known some useful information may be available on which further effective control measures can be based.

Fruit-eating Caterpillars.

Several species of fruit-eating caterpillars attack the skin of the fruit, while some feed first on the skin and subsequently penetrate to the pulp, on which they then feed. The skin erosion at best gives an unattractive appearance to the fruit, and if it is followed by cracking the fruit becomes valueless. Where the pulp is attacked the fruit is of course a total loss.

Quite a number of species of caterpillars are responsible for this type of damage, and in some seasons one species at least may be so abundant as to inflict very severe losses. Such an epidemic occurred in 1927, when enormous numbers of the caterpillars (Plate 85, fig. 3) of the Noctuid moth *Tiracola plagiata* Wlk. (Plate 85, fig. 4) migrated from the weeds on which they were feeding on the edges of the banana plantations. They then attacked the foliage and fruit of the bananas, and in the course of a few weeks they inflicted very severe losses on many plantations (Plate 88).

Where there is evidence of the recurrence of such an attack, serious consideration might be given to the use of poison bran baits, which would intercept at least a very large proportion of the caterpillars before they reached the bananas. The migrating caterpillars that fed on the bran baits scattered on the ground would rapidly succumb to the effects of the Paris green contained in the baits. The preparation of these baits is discussed in the chapter dealing with insecticides.

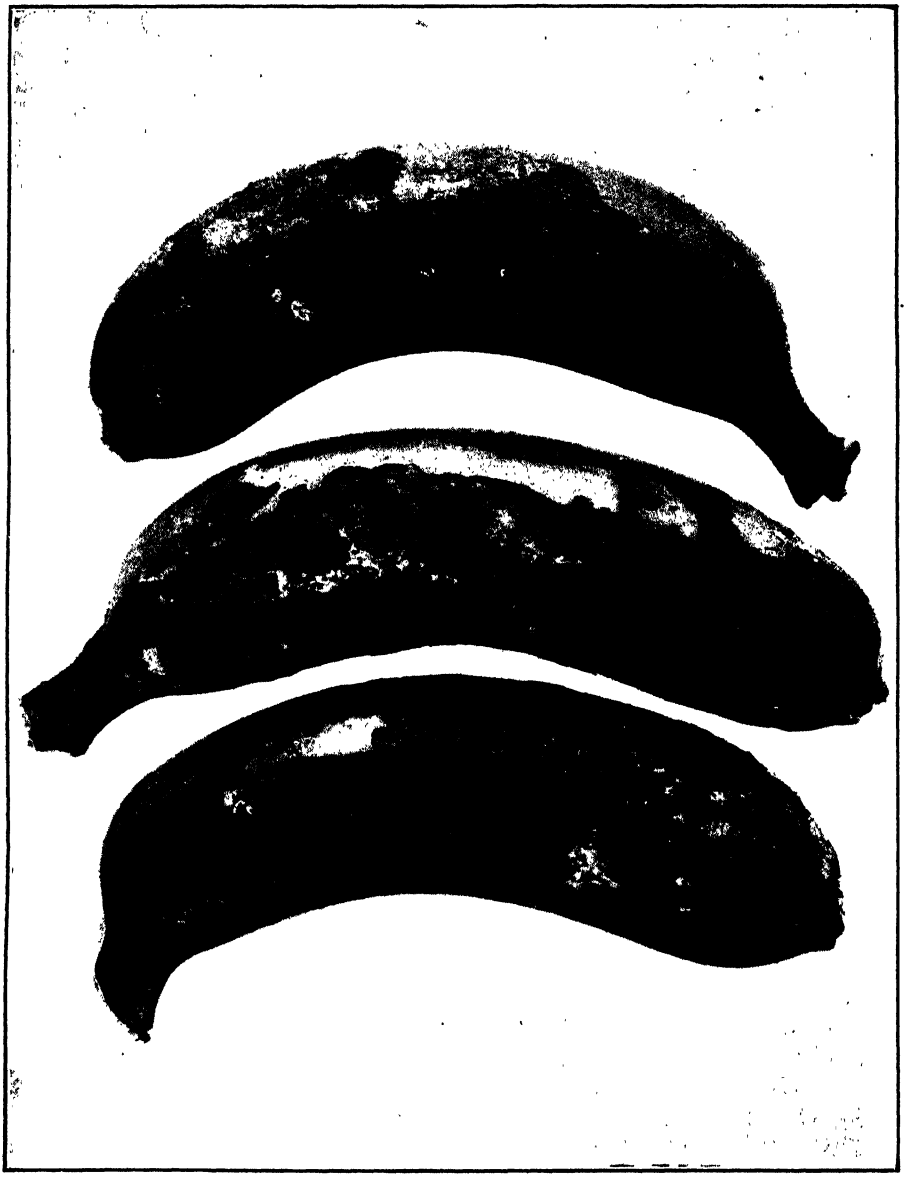


PLATE 88.—DAMAGE CAUSED BY FRUIT-EATING CATERPILLARS (*Tiracola plagiata* Wlk.).

Banana Fruit Fly.

Several fruit flies attack bananas in this State, the species that is entitled to the unwelcome distinction of being called "the banana fruit fly" being *Chætodacus musæ* Tryon (Plate 89). This fly appears to be responsible for the injury to bananas grown north of Cardwell, and from that district right up to Cairns it may be regarded as a pest of some importance. In Southern Queensland fruit-fly infestation is caused by the Queensland fruit fly (*Chætodacus tryoni* Froggatt) and the boatman fly (*Rioxa musæ* Froggatt), most of the injury being inflicted by the first-mentioned species. Fruit-fly losses in the Southern banana-growing districts are, however, of but very slight importance, largely because the Queensland fruit fly, the chief culprit in Southern areas, generally confines its attacks to mature fruit produced in summer. The banana fruit fly, on the other hand, has frequently been found by Froggatt attacking immature fruit that is only two-thirds developed, and hence it assumes some considerable degree of importance.

LIFE HISTORY.

This pest lays its eggs (Plate 89, fig. 1) in the skin of the fruit, and the maggots (Plate 89, fig. 2) hatching therefrom feed in the pulp, thus producing disintegration of the tissue and rendering the fruit valueless. When full-grown the maggots leave the infested fruit and form their brown puparia (Plate 89, fig. 3) in the soil. The reddish-brown flies (Plate 89, fig. 4) subsequently emerge and carry on the work of infestation. Detailed information is not yet available with respect to the duration of the various life-cycle stages of this pest. It has been bred from the native banana (*Musa banksii*), but so far no other host records have been obtained, although efforts have been made to do so.

CONTROL.

The banana fruit fly has not been the subject of such detailed study as has been devoted to its relative the Queensland fruit fly, but nevertheless some information of value is available with respect to its control.

Firstly strict attention should be paid to plantation hygiene, and consequently all discarded or infested fruit should be collected and disposed of in such a manner as to preclude its giving rise to a brood of flies. The best means of attaining this object can be most appropriately determined on the plantation itself. Various means whereby infested fruit may be disposed of have already been discussed in an earlier chapter when dealing with the Queensland fruit fly.

A further useful procedure is to eliminate, so far as it is practicable to do so, all wild banana plants growing in or in the immediate vicinity of cultivated banana plantations. Unless these wild banana plants are destroyed they will quite undoubtedly serve to breed up flies to infest the fruit on which the banana-grower depends for his existence.

For many years stockinet has been used in North Queensland to protect the banana bunches from fruit-fly infestation. This procedure is quite effective, and furthermore it is economically practicable. The stockinet is made in a tubular form suitable for covering the bunches, and its use could be enthusiastically recommended but for one factor, namely its apparent tendency to aggravate thrips infestation. Hence, if stockinet is used to prevent fruit-fly infestation, extra precautions

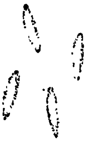


Fig 1 × 6

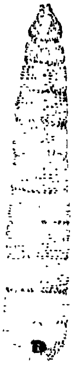


Fig 2 × 6

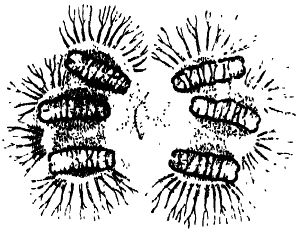


Fig 2A × 210.

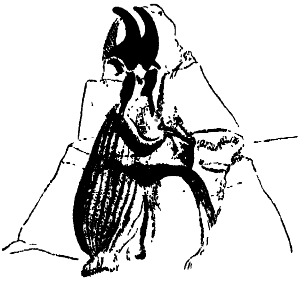


Fig 2B × 30

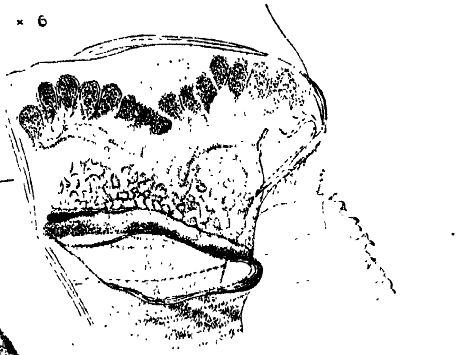


Fig 2C × 210

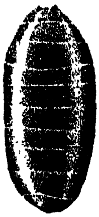


Fig 3 × 5

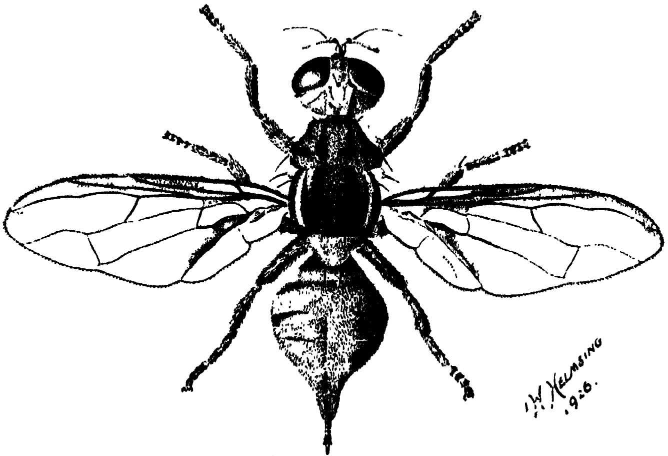


Fig 4 × 6

PLATE 89.—THE BANANA FRUIT FLY (*Chætodacus musæ* Tryon).

Fig. 1, Eggs, × 6. Fig. 2, Larva, × 6. Fig. 2A, Stigmal discs of larva, × 210. Fig. 2B, Jaws of larva, × 30. Fig. 2C, Anterior spiracle of larva, × 210. Fig. 3, Puparium, × 5. Fig. 4, Imago, × 6.

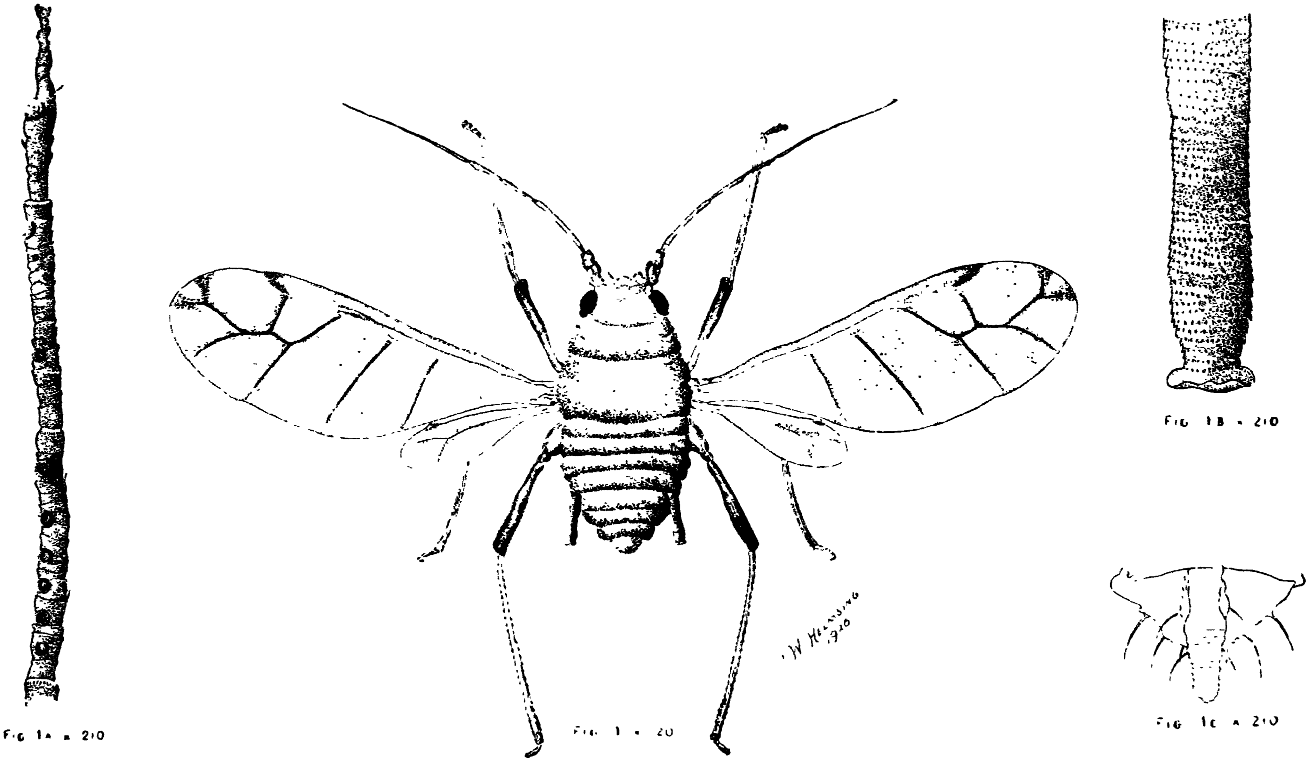


PLATE 90.—THE BANANA APHIS (*Pentalonia nigronervosa* COQ.), THE CARRIER OF THE BUNCHY TOP VIRUS.

Fig. 1, Winged adult, × 20. Fig. 1A, Segments 3 and 4 and portion of 5 of antenna of adult, showing sensory organs, × 210. Fig. 1B, Cornicle of adult, × 210. Fig. 1C, Anal segment of adult, × 210.

must be taken to keep the thrips population within reasonable bounds. Once a thoroughly effective thrips insecticide is available which will be safe for use by the ordinary banana-grower under average plantation conditions, and it can be applied in conjunction with the covering of the bunches, then the interdependent problems of thrips and fruit-fly control will have been solved.

The Banana Aphis.

The species commonly known as the banana aphis, *Pentalonia nigronervosa* Coq. (Plate 90, fig. 1), occurs practically wherever bananas are grown in this State. Large colonies of this insect may be seen underneath the leaf-bases and in the throat of the plant, and it may be seen in smaller numbers on the fruit and foliage. Furthermore, it may be found in very considerable numbers at the base of the stool beneath ground-level.

This insect feeds by sucking the plant sap, but it is not considered that its presence is of any practical consequence in districts where bunchy top does not exist. Where that disease occurs, it, however, immediately becomes of first-class importance on account of the part it plays as the insect agency whereby the disease is transmitted from an infected plant to a healthy one. Bunchy top is later discussed in some detail in this chapter.

KILLING OF WEEDS WITH ARSENICAL SPRAYS.

BY J. C. BRUNNICH.

Enquiries are frequently made about the use of arsenical sprays for the killing of weeds. There are several arsenical weed killers on the market, which can be used for this purpose, or anyone can make his own solution by the following method:—

Mix 4 lb. of grey arsenic with 1 lb. of caustic soda in the dry state, and slowly add water to make 4 gallons of a concentrated solution. Sufficient heat is generated in the process to bring the solution almost to boiling point. If washing soda is used instead of caustic soda 4 lb. are required, which are dissolved in about 3 gallons of water, which is brought to the boil and the 4 lb. of arsenic are added, and the solution kept boiling until all the arsenic is dissolved, which generally takes about half an hour, when sufficient water is added to make 4 gallons.

For the spraying dilute 1 pint of this concentrated solution with 4 gallons of water. From 75 to 100 gallons of the spraying solution are required per acre. The spray is only successful for the destruction of succulent weeds in their early stages of growth.

For the destruction of prickly-pear, instead of grey arsenic, at present arsenic pentoxide, supplied by the Prickly-pear Commission at cost price, is largely used, and this may be successfully employed for killing of weeds generally, and has the great advantage that it can be dissolved in water without the use of soda.

The Bureau of Sugar Experiment Stations made experiment with arsenical sprays in the Mackay Sugar Experiment Station in 1915, and found that weeds like pigweed, billy goat weed, asthma weed were practically killed with one spraying; grasses like couch grass and cocksfoot could not be killed even with repeated sprayings at short intervals. The cost of one spraying was about £1 per acre on the headlands, and nearly £2 per acre amongst the cane rows.

When preparing and using arsenical sprays, great care must be taken that the fumes when boiling the solution should not be inhaled, and allowing boots, socks, and clothing generally to become sodden with the arsenical solution will lead to serious illness. Before taking any meal the hands must be carefully washed, and also the whole body should be washed as frequently as possible in intervals between the spraying operations, as the poison is readily absorbed through the open pores of the skin.

The risks of using such poisonous sprays in banana plantations and sugar-cane fields are so great that the Department of Agriculture and Stock does not recommend the general use, and only in a few exceptional cases the use of arsenical sprays is justified and economic.

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Once again the Brisbane Show, held on 12th August and following days, presented impressive proof of the fecundity of the Commonwealth's richest province. It reflected Queensland's immense resources and the great work of our country people in their development.

Regarding the Exhibition as a microcosm of the whole State, presenting an extraordinary range of rural production and diversity of rural interests within its borders, it is difficult to place a limit on any estimation of future progress. It showed how early promise has adready ripened into fulfilment; and revealed a vista of vastly greater achievement in the years to come.

Our major and most of our minor industries, as well as their tributary enterprises, were represented at Bowen Park, where huge daily crowds saw, appraised, and appreciated the extent to which Queensland depends on primary production.

It is said, and very truly, that a visit to the Brisbane Show is one of the best cures for pessimism. This annual event is a breeder of optimism as well as an exemplar of opulence, and anyone who observed, on the opening day, the general air of prosperity of the hundred thousand Queenslanders gathered in the pavilions and around the arena; who studied their work of brain and hand so well displayed; and who realised that only the edge of opportunity, provided by lavish natural endowment, is as yet exploited, could not fail to feel a quickened faith in Queensland's future.

The Show again presented impressive evidence of how town and country are linked in industry; how the application of sound principles work out in modern farming practice; how stock can be improved by selection, breeding, and feeding; of the extent to which the engineer assists the agriculturist; and how essential science is to our daily life and work.

BRILLIANTLY fine weather favoured the Royal National Association for its 1929 Exhibition, which was opened officially by His Excellency the Governor, Sir John Goodwin, accompanied by Lady Goodwin, on Wednesday, 14th August, in the presence of nearly a hundred thousand people, including His Excellency the Governor-General (Lord Stonehaven) and Lady Stonehaven, and many more notable visitors from other States.

To describe the Show in a single sentence, it was an exhibition of Australian industry running on ball-bearings. It was also a demonstration of Queensland's prosperity, and of the energy, skill, inventive ability, and organising powers of the people who are doing the real work of the State—whether in production, construction, administration, or social services.

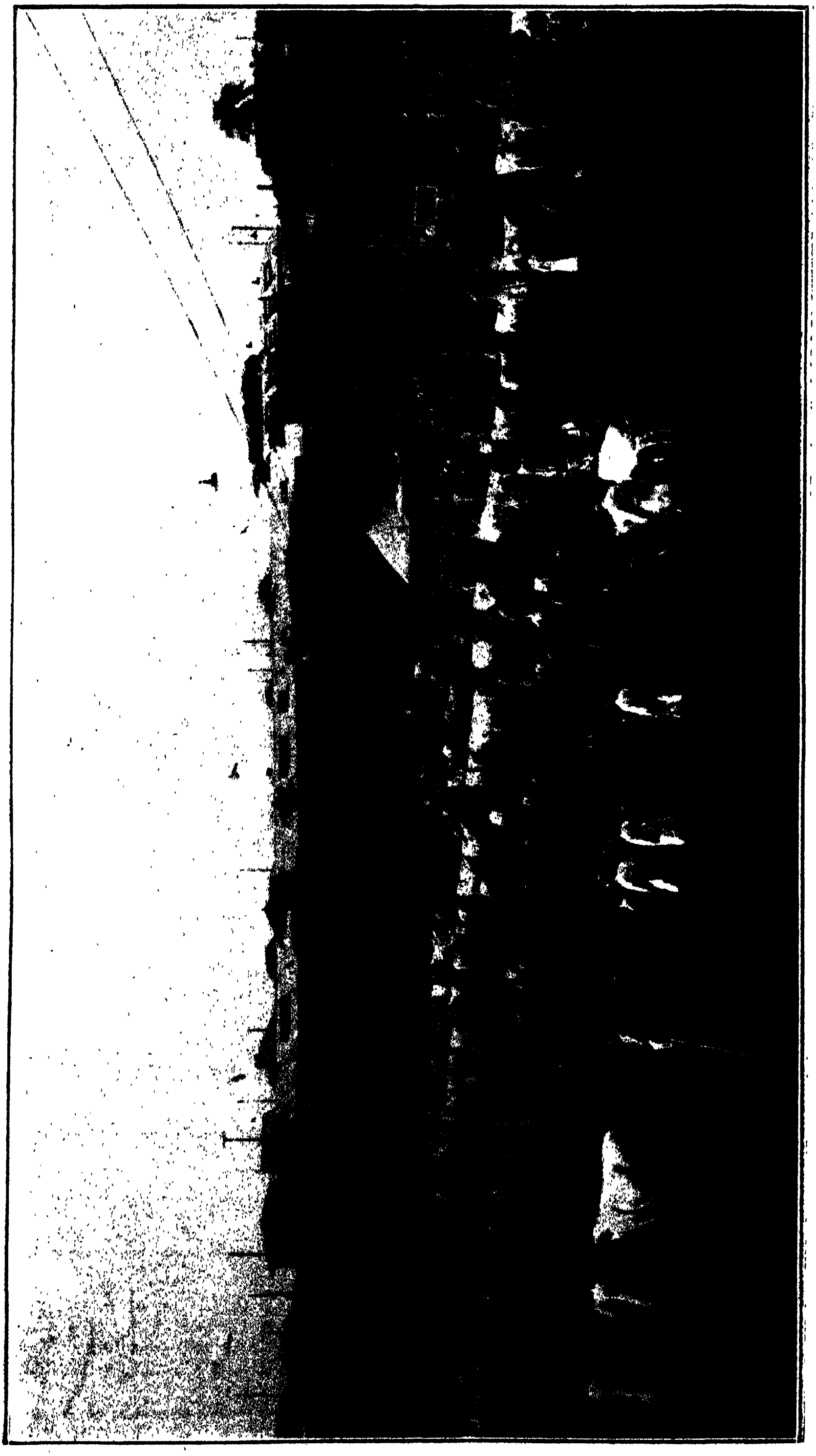

PLATE 91.—THE GRAND STOCK PARADE.

A Fountain of Progressive Ideas.

The Royal National Association has the good fortune to have big men at the head of its affairs. It is, therefore, a fountain of progressive ideas, and a strong educational force; and no one will deny its importance as a contributor to our national welfare. It stands for better farming, better stock, better business, better public service, and bigger returns for the man on the land. Another thing about the Association is that it is never guilty of taking a narrow view, nor of pessimism in any of its constrictive or depressing forms. With an overwhelming pride in the State and a confidence in its future it goes about its job with zeal and healthy optimism that are most commendable. The story of the Royal National Association was presented in concentrated form at its Fifty-fourth Annual Show.

To what degree its useful purpose to Queensland has been proved can hardly be realised adequately; to what extent it will continue to radiate its influence and how far it will develop its greatness as a factor in the brightening and prospering of country life can be imagined more readily, for is not the Brisbane Exhibition itself extraordinary evidence of the energy, the enterprise, the strength and vigour of rural industry that it is the Association's daily job to develop and upon which rests the soundness and the completeness of our national existence?

Outstanding Displays.

Among the big pavilion displays was the Court of the Department of Agriculture and Stock. In it was staged a comprehensive and complete representation of all the agricultural activities of the State. Other outstanding indoor displays included the "Valley of the Giants," a realistic replica of a section of a satinay forest on Fraser Island; district exhibits, a class in which this year's competition was very keen; the "One Farm" efforts; the competitive entries in the agricultural produce section; and the rural and technical schools' array of examples of juvenile craftsmanship. Other excellent displays were those in the Meat Industry Hall, and of the Queensland Agricultural High School and College.

The Farm Boys' Camp was again a feature of the Show, and the suggestion has been made that the underlying idea of this successful plan for extending rural education might be adopted in regard to a similar camp at the Sydney Show for young Queensland farmers. The boys, who were chosen from among project club members, were the guests of the Royal National Association. School teachers all over the State are teaching the farmers of the future the value of scientific methods in every branch of husbandry, and are cultivating a genuine agricultural bias in the minds of bright young country people. They are showing, too, that scientific principles apply to grain improvement as well as to stock breeding, that agricultural science points the way to independence, and these fine lads saw object lessons in everything they viewed in their tireless quest for information.

In the Departmental Court the value of science in the paddock and in the dairy, as well as in the laboratory, was demonstrated again by experts who know their job and all its newest developments. The exhibits illustrated what can be done, and the Departmental demonstrators were in attendance to tell the farmer the best, cheapest, and quickest way of doing the work. Research results of official investigations into the many forms of animal and plant diseases were revealed, and to the man on the land it was made plain that, to-day, science is just as essential as the plough and the harrow.

The stock this year well illustrated the advance Queensland has made in animal husbandry, and it is doubtful if livestock of a higher standard could be paraded at any other Australian show. With the dairy cows it was a case of beauty and the bucket, and both were winners—a happy combination of cream-can value and show-ring shapeliness.

In the machinery section every exhibit was a pointer to industrial prosperity along the modern mechanical road.

Generally, a whole world of activity revolved around the Exhibition ground, and behind it all—behind the artistically arranged galleries and galaxies; behind the attractive trophies of cereal and other crops, and the colorful array of citrus and other fruits; behind the animals in the stalls and in the arena; behind all the marvellous collections of modern mechanism; behind the bustle of the whole business—there was the work of the farmer, the economist, the scientist, and the technician; and at the back of all was our great system of national education that, though by no means perfect, is already producing the fruits of hard-won and well deserved success.

PLATE 92.—THE VICE-REGAL PARTY INTERESTED IN THE RING EVENTS.

From right to left: Lady Goodwin, Sir John Goodwin, Mr. Ernest Baynes, and Lieut.-Colonel L. E. C. Worthington-Wilmer.

A Queensland Institution.

There is another side of the Brisbane Show, and that is its social value—the annual gathering of producers from every district in the State's immense territory, from its furthermost boundaries, and beyond. For them it provides a clearing house for a year's experiences and a forum for friendly argument.

Thus the Brisbane Exhibition goes on from success to success, breaking yearly every entry and attendance record. This Queensland institution, for it is nothing less, is one of the most impressive signs of our agricultural advance. It gives us something more than encouragement; it gives us the inspiration that comes from the other man's success. We realise, for instance, that the farmer who never tests his herd or conserves a ton of fodder is hopelessly out of date—for there is the evidence before us, the evidence of the Exhibition itself, that better husbandry means better business and bigger cheques; the evidence of co-operation in industry; the evidence of the common sense of mutual aid which when fully applied will lighten our common tasks, ensure our common good, and add immeasurably to our common wealth.

THE OPENING CEREMONY.

SIR John Goodwin said that it was a very great pleasure indeed for both himself and Lady Goodwin to be present at the Show. Every year they looked forward to the Brisbane Exhibition, and were always delighted to attend. They met so many friends from the country, and they saw so many magnificent exhibits that it was one round of delight from start to finish. He was particularly pleased with this year's show, for which there was a very large increase of exhibits displaying quality as well as quantity all round. There was a general improvement in the show in every direction—in buildings, exhibits, and what had been carried out to increase the comfort of both exhibitors and public. There were many exhibits which he had not seen, though he had been present each day. This indicated that he had not been altogether idle. As he had not seen every exhibit, he would not make many remarks concerning them generally. He thought that anyone coming from England, or for that matter, from any country in the world, who walked round the show and saw the dairy cattle, the meat, district, and farm exhibits could not be but impressed, and could not but hold the honest opinion that this show could compare more than favourably with any show in the world. It was not merely an exhibition carried on by the Royal National Association but something that fulfilled many other purposes. In his opinion it was one of the most educative factors in the State. The Association was carrying out an immense service to the people of Queensland not only in the present but also for the future. He congratulated the Association most sincerely on what it had accomplished, and for the untiring work all connected with it had put in and for their unceasing efforts to carry out improvements in the interests of the pastoralists, agriculturists, and people generally. He had much pleasure in declaring the show open.

The Vice-Regal visitors were welcomed by Mr. Ernest Baynes (President) on behalf of the Council and members of the Royal National Association.

Included in the gathering besides the Governor of Queensland and Lady Goodwin were the Governor-General of Australia, Lord Stonehaven, Lady Stonehaven; the Premier of Queensland, Hon. A. E. Moore; the Minister of Agriculture and Stock, Hon. Harry F. Walker; the Minister of Mines, Hon. E. A. Atherton; the Minister of Transport, Hon. Godfrey Morgan; the Minister of Labour and Industry, Hon. H. E. Sizer; the Minister of Education and Works, Hon. R. M. King; the Chief Justice, Hon. J. W. Blair; the Leader of the Opposition, Hon. W. Forgan Smith; the Mayor of Brisbane, Alderman W. A. Jolly; the President of the Royal National Association, Mr. Ernest Baynes; the Under Secretary for Agriculture and Stock, Mr. E. Graham; the Assistant Under Secretary, Mr. Robt. Wilson; the Director of Agriculture, Mr. H. C. Quodling; the Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby; the Chief Inspector of Stock, Major A. H. Cory; the Director of Fruit Culture, Mr. Geo. Williams; the Chief Supervisor of Dairying, Mr. Chas. McGrath; the Agricultural Chemist, Mr. J. C. Brünnich; the Government Entomologist, Mr. Robert Veitch; Messrs. W. A. Affleck, J. P. Bottomley, and H. S. Cribb; the Secretary of the Royal National Association, Mr. J. Bain; and the Acting Secretary, Mr. H. W. Watson.

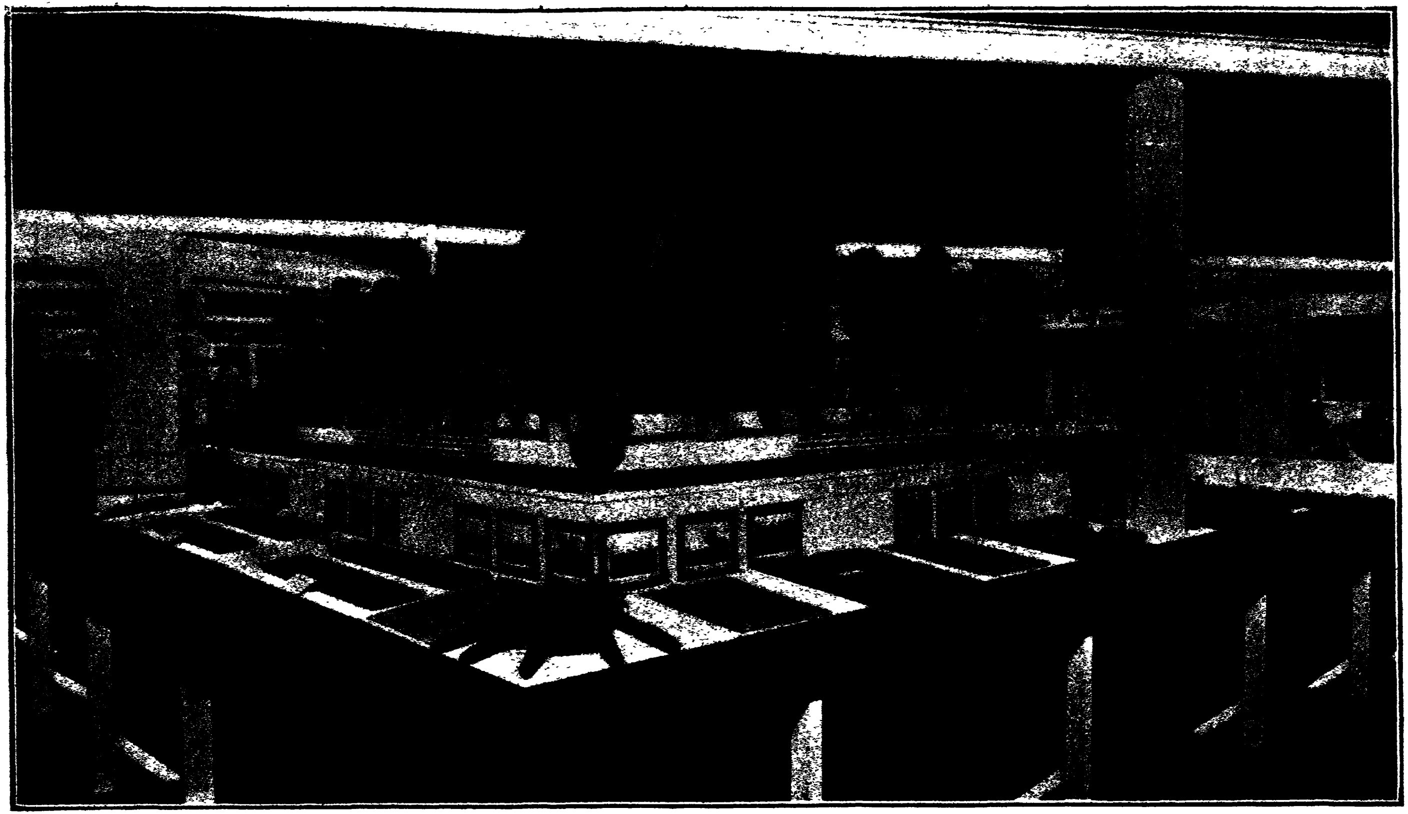

PLATE 93.—THE CENTRAL TROPHY IN THE DEPARTMENTAL COURT.

The practical results in grain improvement achieved by Departmental Plant Breeders were well illustrated in this exhibit, of which wheat and maize were the strongest features.

THE COURT OF AGRICULTURE.

REPRESENTATION AND REVIEW OF DEPARTMENTAL ACTIVITIES.

This year the Court of the Department of Agriculture and Stock was, as usual, a centre of great public interest, and the standard of excellence reached in the preparation and in the staging of the exhibits reflected very great credit on the officers responsible for a fine educational effort.

The activities of officers of the Agricultural Branch under the supervision of the Director of Agriculture, Mr. H. C. Quodling, were illustrated by two separate displays, one occupying the full width of the upper part of the court, and the other forming the main central trophy. The former presented a large and varied assortment of wheat, oat, and barley sheaves and grain drawn principally from Departmental experiment plots on the Darling Downs. In the preparation and staging of the sheaves the individual heads of each had been arranged in a series of "steps," giving an artistic effect. A close examination by the more practical-minded observer immediately inspired a feeling of optimism in the future of a country capable of producing cereals of such outstanding quality. The exhibit itself was so arranged that those who had the time to read the descriptive placards were impressed with the fact that the present-day producer of primary products must be a thinker, and one who, to be successful, must possess a knowledge of the underlying principles of cultivation, and with what may be termed the factors of production.

CEREAL CROPS—NEW TYPES EVOLVED.

Wheat.

In juxtaposition was a display from the Roma State Farm of wheat ears mounted on screens, with relevant descriptions, to illustrate the work of wheat breeding, and of the way in which certain unit characters appear in subsequent plant generations. The significance of this highly technical work which is carried on by Mr. R. E. Soutter lies in the breeding, selection, and development of special varieties of wheat to suit Queensland conditions; the Roma State Farm crossbreds being subsequently passed on to officers of the Field Branch of the Department for further test in different districts, and these are carried out over a series of seasons to determine the better and more dependable varieties for commercial purposes.

Maize.

Prominence was given on the central trophy to maize and to the improvement work carried out by the Maize Specialist, Mr. C. J. McKeon, Instructor in Agriculture. Several varieties of maize formed the subject of this improvement work, and the standard of excellence attained was manifest in the quality, type, and uniformity of the grain exhibited. Methods of seed selection and improvement were set out on the trophy in such a way that a more intimate knowedge of this important factor in the improvement in the type and yield of crops might be readily acquired. As the Department makes a practice of raising quantities of seed each year for sale to farmers, every grower has an opportunity of purchasing improved seed equal in quality and productivity to that exhibited.

An attractive assortment of wheat, oats, barley, rice, and canary seed was also included in this array of grain types and classes.

QUEENSLAND'S GREAT SUGAR INDUSTRY.

The varieties of cane exhibited by the Bureau of Sugar Experiment Stations included varieties from Hawaii, Java, India, Mauritius, and Queensland. The Queensland canes included new varieties raised from seed at the Sugar Experiment Station at South Johnstone. Up to the present about 34,500 of these seedlings have been raised, but many of them, of course, are weeded out in the process of selection. It is hoped this year to plant out 10,000 new seedlings in the field. Commercial trials of the best of them are now being undertaken, also experiments as to their disease-resisting qualities.

Testing Cane Varieties.

Before any cane varieties are allowed to leave the experiment stations they have to pass chemical and commercial trials through plant, first ratoon, and second ratoon crops. Each variety is tested not less than four times in the course of the sugar season, so that records are obtained giving farmers and millowners information

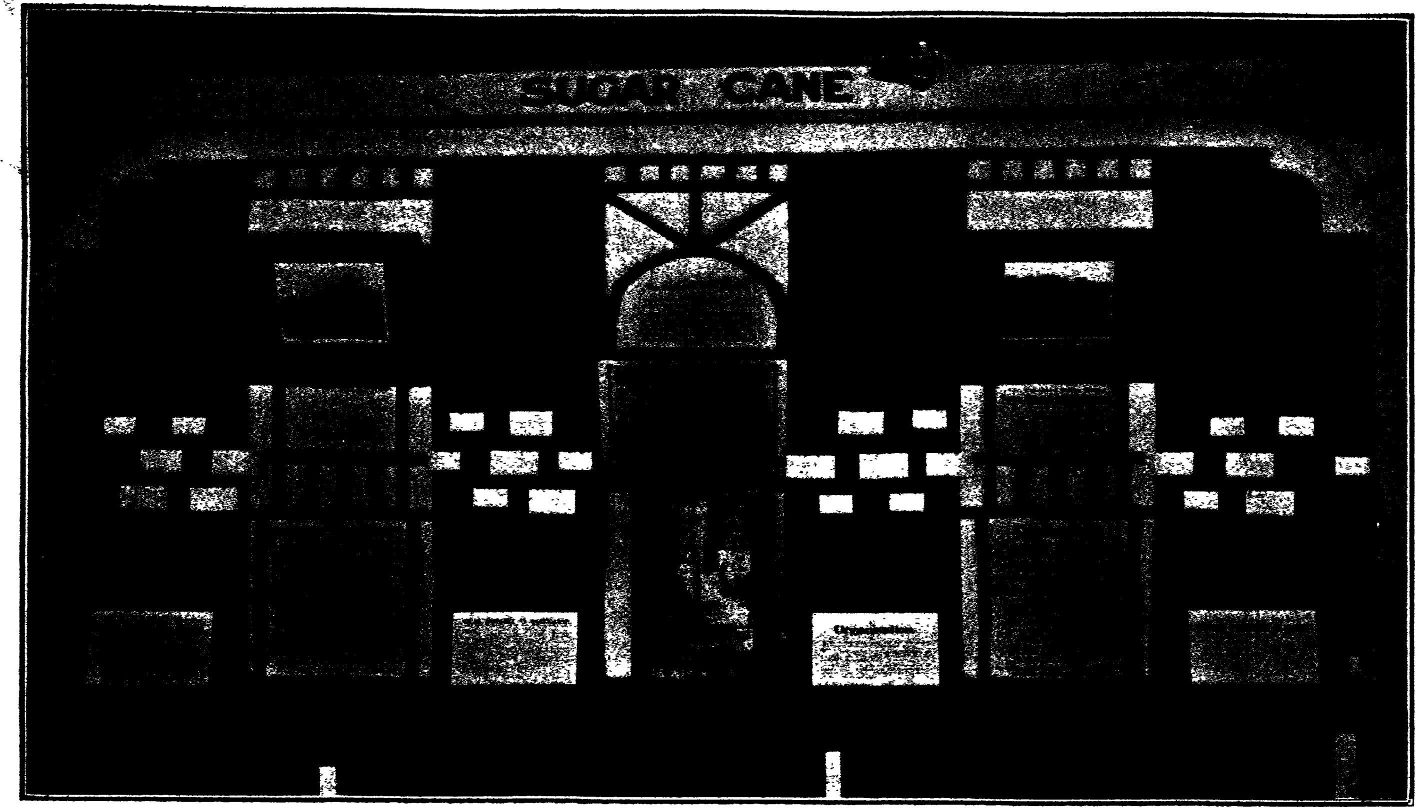

PLATE 94.—A WHITE MAN'S INDUSTRY IN A WHITE MAN'S LAND.

Cane-growing in Queensland is the only sugar industry in the world that is carried on entirely by white workers. It is the State's leading agricultural enterprise. In this bay of the Departmental Court the field and laboratory activities of the Bureau of Sugar Experiment Stations were strongly represented.

as to whether canes are early or late, and as to whether their sugar content is sufficiently high to warrant their adoption. This is combined with agricultural trials in the field, so that it may be determined whether such varieties are good croppers. They are further keenly watched for evidence of disease, and no affected canes are allowed to go into distribution. When varieties have passed these trials they are carefully examined and packed before being sent to growers living at a distance, and all canes are distributed free to growers. The worthless varieties are discarded. Information of this kind could only otherwise be secured by growers and millers at he cost of much time and money, and the rejection of many useless canes by the mills, which would be accompanied by severe loss to the growers.

Full descriptions of the varieties exhibited appeared on the cards attached to the canes, which also gave commercial cane sugar content. Many of these canes are at present undergoing chemical and field tests, while others have passed the probationary period and are being distributed to canegrowers. These varieties, however, comprise a very small part of the number of new and tested canes that have been distributed from the experiment stations during the past twenty years.

Sugar-cane Propagation.

The Sugar Experiment Station at South Johnstone, near Innisfail, has for six years been engaged in the direction of raising cane from the seed. This requires the utmost care, for the seed is very minute and has to be most carefully handled. Specially prepared boxes of soil which have previously been sterilised are used. The cane arrows, when mature, are gently broken off, spread over the soil, watered, and then covered with glass plates. When germination takes place a large number of minute shoots like grass appear. When these have made further growth they are carefully pricked out into pots or boxes, and are ultimately removed to the field.

Soils, Cultivation, and Fertilising.

Work at the experiment stations also comprises the study of soils, cultivation, and fertilising. It is sought to introduce improved methods of cultivation, liming, fertilising, rotation of crops, and conservation of moisture, and growers are taught the principles of cultivation during their visits to the stations, and by lectures and addresses delivered in the several sugar districts; also by the issue of bulletins. This work has been highly successful. The staffs of the stations analyse soils free for canegrowers, and give advice by personal interviews or by letter on the requirements of the soil in the way of application of lime where necessary, green manuring and fertilising, and the treatment of the land by proper soil handling. About 1,800 cane soils have so far been analysed. Cane samples are also tested free of charge, so that growers may know the best time at which to cut their cane. Field officers also move around among farmers, giving advice on cultural operations.

Investigation and Research.

Investigation and research work in connection with the most serious pest of the sugar-cane, viz.—the grub, is now being carried out by the Bureau of Sugar Experiment Stations in a systematic manner, and numerous bulletins on the subject have been issued. The entomological laboratories are situated at Meringa (near Cairns), Bundaberg, and Mackay. Chemical fumigants are being successfully used in the destruction of cane grubs. A pathological staff has also been established to deal with diseases in cane, and travelling pathologists are advising cane farmers on disease questions.

Economic Value of Cane Cultivation—Its National Significance.

The work of the Bureau of Sugar Experiment Stations, in relation to the promotion of the agricultural welfare of Queensland in connection with the sugar industry, cannot be over-estimated. When it is considered that this industry is the greatest agricultural one in Queensland, and will produce about 500,000 tons of sugar this year, estimated to be of the value of about £10,000,000, it will be appreciated how highly necessary it is that it should be assisted and encouraged in every possible way. Apart from its economic value, however, it has a deep national significance, and has already played a very large part in peopling the North.

The Sugar Belt.

On reference to a map of Queensland it will be seen that the land in Queensland used for sugar-growing is included in a long, narrow coastal belt. Parts of this

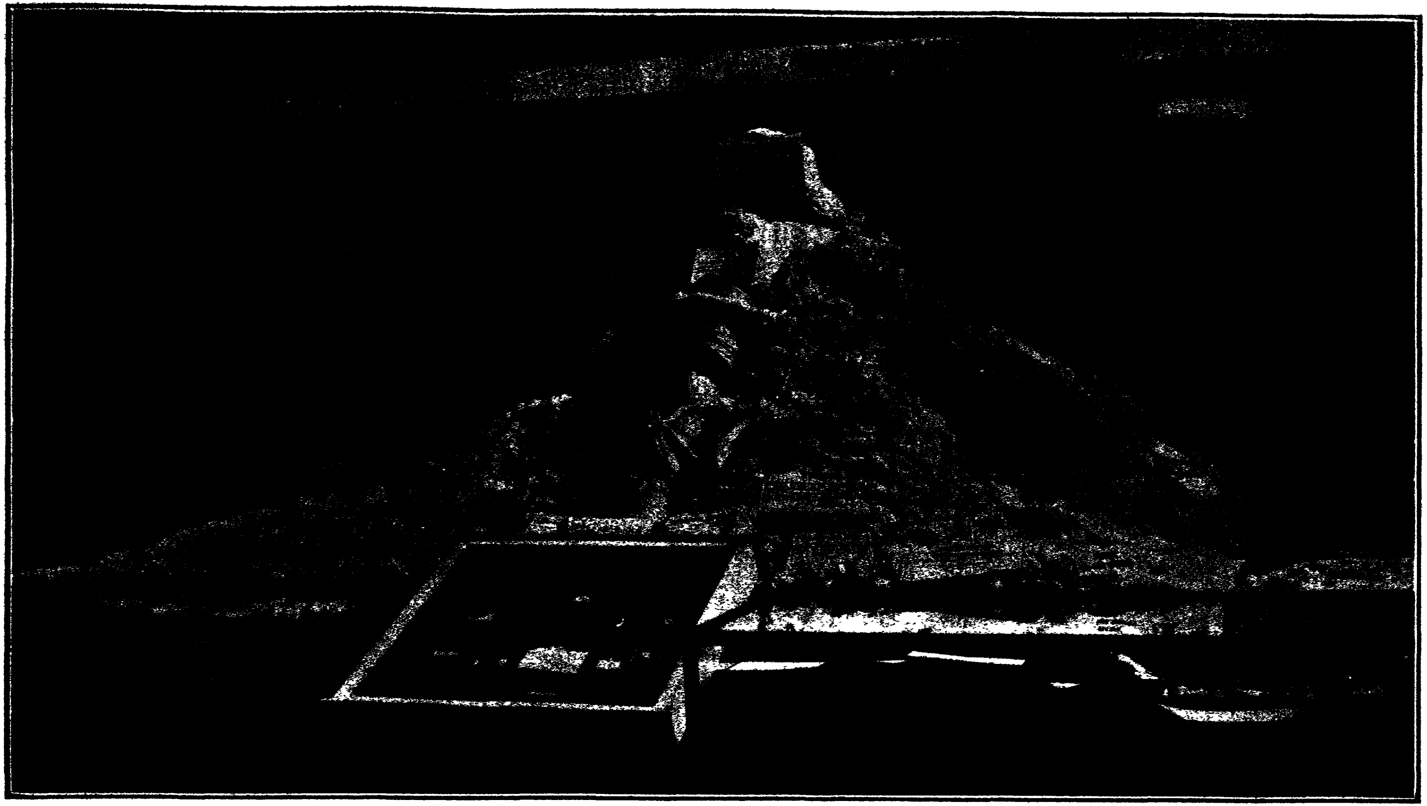

PLATE 95.—FLEECES FROM QUEENSLAND FLOCKS.

A Study of "Counts" and Classes in the Departmental Court.

For the year ending June, 1929, the total value of Queensland's Wool Exports amounted to just under £10,000,000.

belt are separated from each other by considerable tracts of non-sugar country; these latter, owing to a deficient rainfall or poorness of soil, are not suitable for cane. This belt is between latitude 16 deg. and 28 deg. south, and most of the staple is grown within the tropics.

Rainfall.

The Queensland rainfall, fortunately, is highest during summer, when cane makes its greatest growth. The average rainfall in the principal sugar-growing districts is:—Cairns, 92.65; Johnstone River, 160.88; Herbert River, 84.91; Mackay, 66.67; Bundaberg, 44.40. Cane grows best when relative humidity is high, and this is naturally the case during the wet season in Northern Queensland.

Queensland's sugar production in 1867 was 338 tons, and in 1928 reached 520,000 tons, the record crop to date. The yield of cane and sugar per acre is improving, and this is due to better methods of cultivation and breeding and propagation of superior canes. The mills have also largely increased their efficiency. Over £2,000,000 have been spent during the past five years in improving existing milling plants, while, in addition, the Queensland Government has in the Tully River district the most up-to-date sugar plant in Australia.

QUEENSLAND'S WEALTH IN WOOL.

The chief features of a very fine wool exhibit covered a range of merinos and crossbreds typical of those produced in the Coastal and Western divisions of the State. The exhibit was so arranged by the Senior Instructor in Wool, Mr. J. Carew, and his assistant, Mr. J. C. Hodge, to give instruction regarding respective qualities and types staged.

A special feature was made of scoured wool, which had been treated at the Central Technical College, in order to convey to the observer and the student the importance of this phase of the industry. Wool must be scoured in preparation for manufacture, and if this work is done in Queensland before being exported, sea freight weights would be reduced about one half. The Queensland Woollen Company, Ipswich, lent manufactured materials in order to illustrate the progress of the spinning and weaving side of the industry in this State.

In order to demonstrate the uses of sheep skins in wool, the properly flayed skin, and the treated tanned and dyed skins, were displayed. In the saving and proper treatment of skins much less can be avoided.

A small outfit for drenching and treatment of sheep against parasites was on view in an effort to drive home the necessity of keeping these on hand, in case of necessity, on the farm.

A model sheep lick container, fitted for automatic feeding, was shown in order to illustrate how the lick may be supplied without exposure to the weather, and at the same time protect the lick from contamination.

QUEENSLAND'S RICH NATURAL PASTURES.

Queensland's natural pastures have always had a reputation for the quality of the grass and herbage plants composing them. The extent and variety of the Queensland grass flora were well illustrated by a comprehensive collection. Most of Australia's wealth comes primarily from her indigenous grasses and pasture plants. For the year ending June, 1929, the total value of Queensland's wool exports amounted to £9 801,129. This was only one item, and to it must be added the value of beef, mutton, and dairy and other products. Reading these figures one was impressed by the immense importance to Australia of good grasses, and the necessity for those engaged in pastoral pursuits to have some knowledge of that section of economic botany covering native pastures. Attention was directed to the fact that the Department is always willing to report on and name any collections of grasses, weeds, or fodder plants sent by farmers, pastoralists, and others. Among the grasses exhibited were the Blue grass, Mitchell grasses (of which four very distinct kinds are shown), Kangaroo grass, Flinders grass, native panicum grasses, love grasses, and native sorghums.

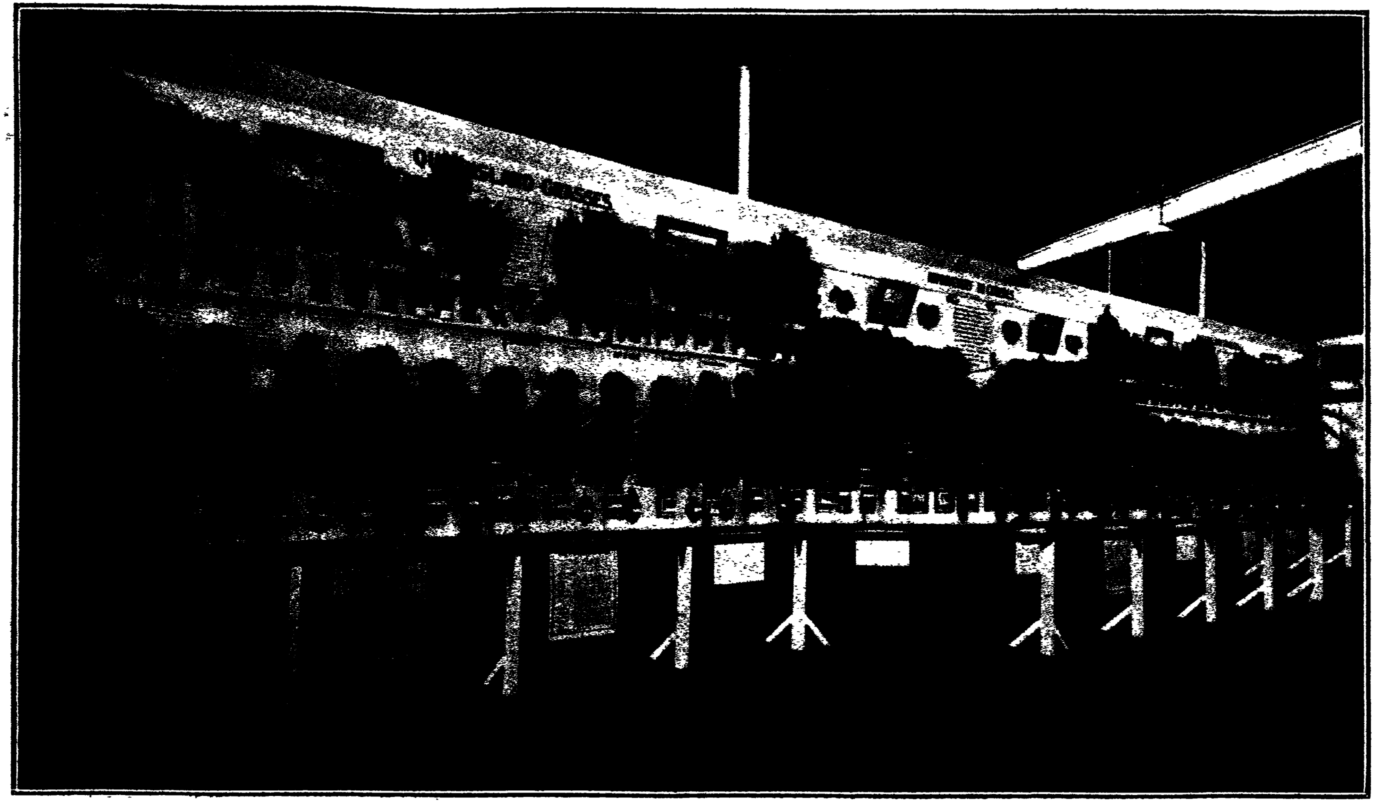

PLATE 96.—GRASS AND GRAIN PRESENTED IN COURT TO WIN A POPULAR VERDICT.

All our immense pastoral wealth is derived primarily from indigenous grasses and edible herbage. By systematic breeding the Department has evolved prolific wheats suitable to Queensland conditions of summer rainfall. This work has been an important factor in quadrupling our grain yield.

WEEDS AND POISONOUS PLANTS.

A representative collection of weeds which have become a source of trouble to horticulturists, agriculturists, and pastoralists, throughout the State was exhibited. A large percentage of them have been introduced along with seeds of economic plants, which shows the necessity of the Pure Seeds Act now in force in the State. Some of the weeds have been introduced through other channels, such as among straw for packing, and imported fodder. Some were introduced originally as ornamental garden plants and have strayed from cultivation and now become the pests we know. The most notable case among these is the Lantana. Some of the most obnoxious have been introduced for hedge making, the worst example being the prickly-pear. The Khaki weed, another of the most obnoxious, if not perhaps the most obnoxious weed ever introduced into the State, is supposed to have come from South Africa at the time of the Boer War, being introduced to that country in fodder from the Argentine for army horses. In the collection were several plants poisonous to stock; among these were the Heart Leaf Poison Bush, Fuchsia Poison Bush, Poison Ironwood, Poison Peach, and Stramonium. The question of plants poisonous to stock is one of the most difficult problems that confronts the botanist and veterinarian alike in Australia. Each specimen in the collection was labelled with its name and information as to its properties, uses, and so forth. This panel was one of the most interesting in the Agricultural Court and attracted the attention of large numbers of stockowners.

COTTON.

The exhibit arranged by the Cotton Section for the Royal National Show illustrated the several factors that enter into the production of a bale of lint.

A comprehensive range of pictures gave an idea of the various stages in the development of the cotton plant from the time of thinning right through to the preparation of its products at the ginnery and the oil mill. Examples of desirable plant types were also on display. There were presented, too, some of the means which the cotton-breeder uses in determining the value of the product. These showed in detail the technical aspects of this work and demonstrated that all cotton is not necessarily good cotton.

In addition were shown examples of the grades for seed cotton used in grading the cotton as it arrives at the ginnery. Likewise, the equivalent grades for lint cotton were exhibited so that one could see the grade of lint to be obtained from each one of the seed cotton grades.

The exhibit also contained samples of the several by-products obtained from cotton seed, thus enabling one to grasp the general outlines of the operations from the selection of the planting seed right through the growth of the plant and the ginning and preparation of its products for commercial usage.

TOBACCO.

An attractive and instructive exhibit of bright tobacco leaf, produced in the Northern Division of the State, was well displayed in the Departmental Court. Occupying a central position, in the alcove allotted, was a stick of cured tobacco as it is taken from the flue-curing barn, showing the manner in which the leaf is strung on the stick after harvesting, for easy handling. Samples of different grades of leaf—such as lemon, orange, and bright mahogany—were shown side by side, thus supplying a useful comparison. Hands of the highest priced lemon colour, produced at Chillagoe, Mareeba, Hervey's Range, Charters Towers, and Pentland were shown to advantage.

Sample sections, to a depth of 2 ft. from the surface, of five soils, each characteristic respectively of collectively large areas in the North, were shown in glass containers. These soil types were considered to be most suitable for the production of bright tobacco and have so been proved in the course of the past two seasons.

Interspersed with these exhibits were cards detailing Commonwealth tobacco statistics. information regarding suitable soils, the culture of the crop and factors; while enlarged photographs of tobacco crops, plants in different stages of growth, flue-curing barns and other equipment, besides being informative added to the attractiveness of what was a most interesting display.

In the Commonwealth Year Book, it will be observed that in the totals of tobacco manufactured in this country during the five years instanced, less than

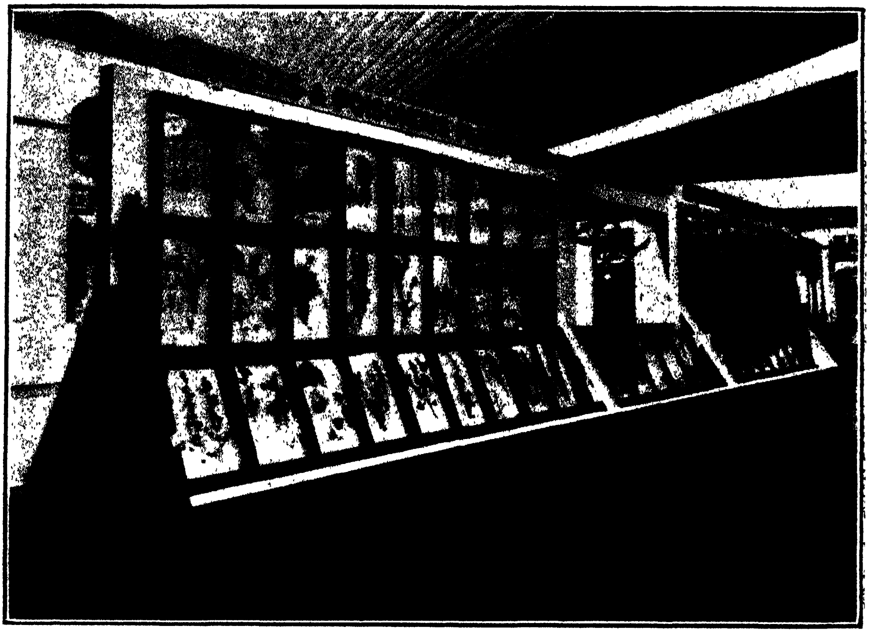

PLATE 97.—A REPRESENTATIVE COLLECTION OF WEEDS AND POISONOUS PLANTS WAS A VERY INTERESTING EXHIBIT IN THE DEPARTMENTAL COURT.

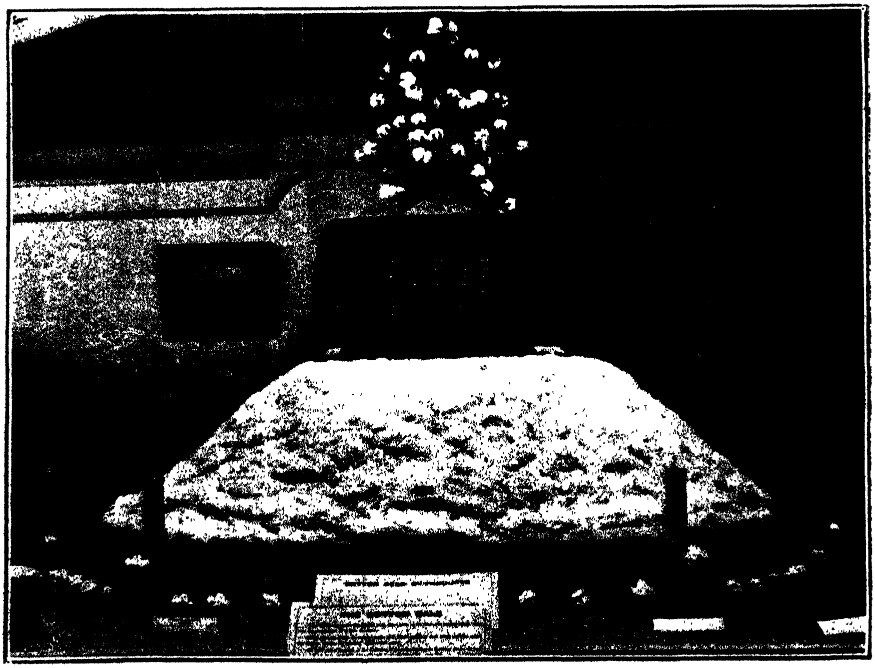

PLATE 98.—CENTRAL QUEENSLAND'S "WHITE HOPE."

This beautiful Trophy in the Court of Agriculture illustrated the fine quality of home-grown Cotton and the wide scope that exists for the further development of the industry.

8 per cent. of Australian-grown leaf was used. Since tobacco leaf has been grown in the temperate zone of Australia for upwards of fifty years, this small proportion used in manufacture denotes at least a lack of appreciation by the home smoker.

Experimental plots have been planted by the Australian Tobacco Investigation Committee in collaboration with the Department of Agriculture in several parts of tropical Queensland. The leaf from these plots on being cured, has proved to be uniformly free of objectionable aroma, while the smoking flavour is agreeable.

The encouraging and uniform results obtained in the 1927-28 season from Chillagoe in the north to Bowen in the south, and as far west as Pentland, which are included in an area of many thousands of square miles, decided the Investigation Executive to concentrate its efforts at Mareeba, where a farm was secured, the necessary buildings erected, and crops of tobacco grown during the past season. In addition small crops were grown by interested people at Chillagoe, the leaf from which was cured at the barn at Mareeba. Leaf from Pentland and the Towers was

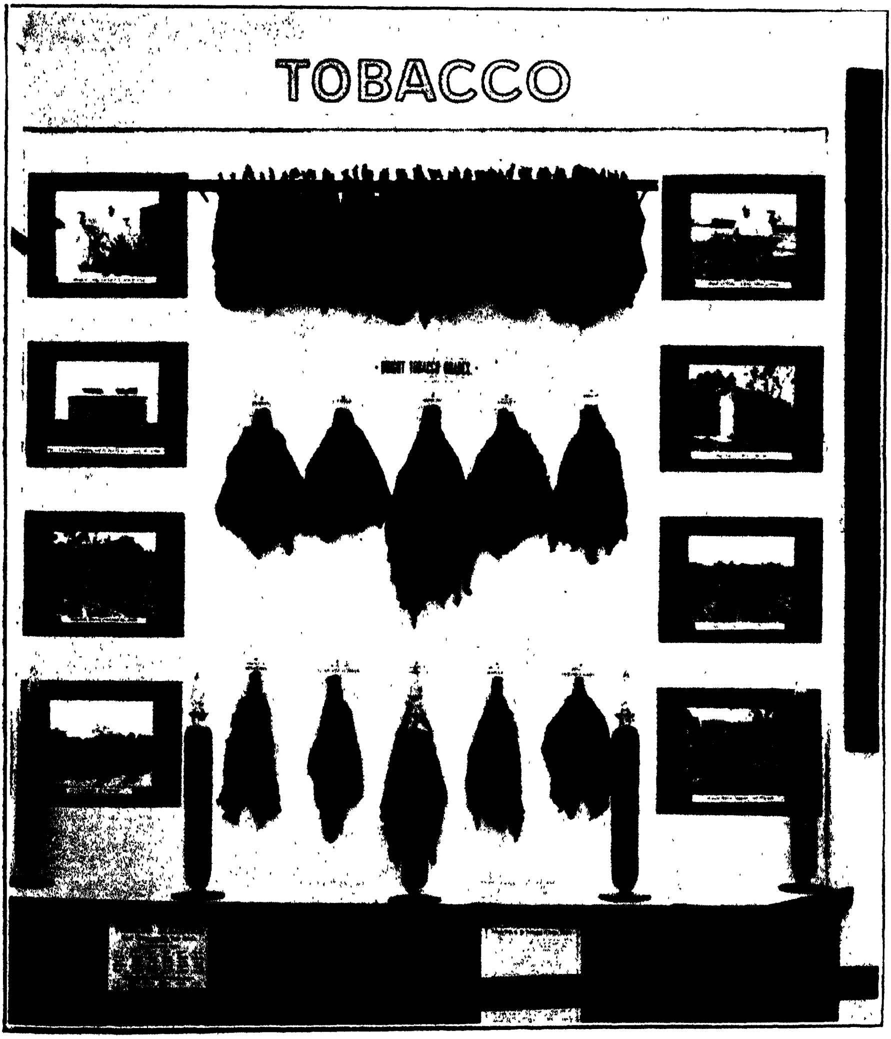

PLATE 99.—QUEENSLAND-GROWN TOBACCO LEAF.

This panel, in the Departmental Court, attracted much attention, for it illustrated the possibilities of what may soon be a thriving Queensland industry.

cured by Departmental officers at a flue-curing barn erected at Charters Towers by the Charters Towers Tobacco Development Association, and at Hervey's Range where a crop was grown by the Townsville Tobacco Development Association. This was also cured by Departmental officers in a full-sized flue-curing barn erected by the syndicate for the purpose. The leaf from these crops, samples of which were shown in the Court, was of an excellent quality, and was stated by a competent authority to be the best yet produced in Australia.

The value of tobacco, both manufactured and untreated, imported into Australia each year, apart from customs charges, amounts to upwards of £3,000,000.

The prospects of North Queensland, should the tobacco produced there meet, as is anticipated, widespread approval, would be extremely bright.

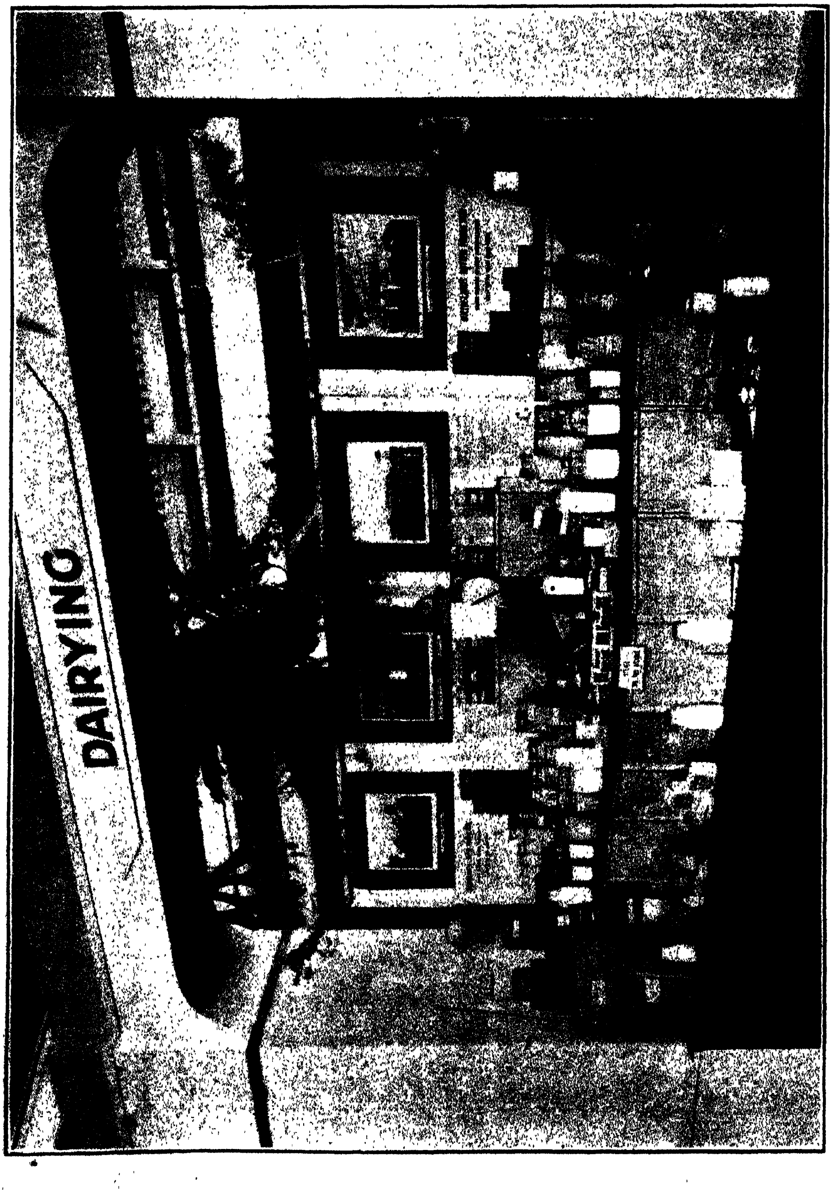

PLATE 100.—A REPRESENTATION OF WHAT THE DAIRY INDUSTRY MEANS TO QUEENSLAND.
This great enterprise now ranks next to Sugar in aggregate annual value.

McKenzie & Holland
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Electrical and Mechanical Engineers
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Manufacturers of Complete Layouts and Junctions for Railways and Tramways, Dog Spikes, Rivets, Bolts, Nuts, etc.

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Good Cows are Never Costly

The Dairyman who hesitates about buying better stock is taking a backward step. A mongrel breed costs more to feed than pure-bred, and NEVER gives adequate value. The Farmer who realises that good stock means increased production also realises the value of a good Separator—that is why the majority favour the famous

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The machine that never misses a fraction of Cream

THE NEW JUBILEE MODEL

is a marvellous machine. Its gearing is entirely new, and its Bowl will outskim the best of separators. To introduce the New Jubilee Model, we are making a FREE TRIAL OFFER. There is no obligation. Send the coupon and try it out for thirty days. If you decide to keep it, we will trade in your old machine as part payment.

FREE TRIAL OFFER.

Without any obligation, please send me one Jubilee Model DIABOLO..........gallons, on 30 Days' Free Trial.

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DAIRYING.

The Dairy Exhibit was again a comprehensive and most instructive one. The principal products of milk were shown in various stages of manufacture.

The chemical constituents of a gallon of milk, a pound of butter, and a pound of cheese were exhibited in their exact quantities as separated by the analyst. Samples of by-products were shown and their value emphasised. Desiccated butter milk, for instance, was on view in its early and finished stage; this by-product is invaluable as a supplement to ordinary poultry foods, and although there is a good demand for the present output there is much room for its expansion in Queensland, which would prove of mutual benefit to the dairyman and poultry breeder alike. Casein is probably the most valuable product of skim milk, and its multiple uses were featured. Coloured graphs effectively showed at a glance the wonderful advance Queensland has made in the production of butter and cheese since 1890.

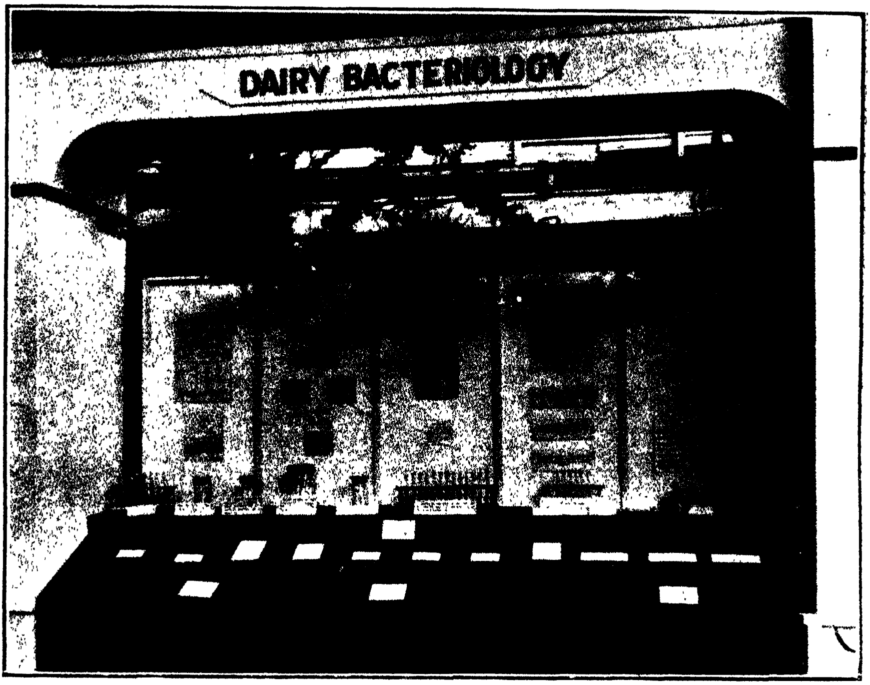


PLATE 101.—MILK AND MICROBES.

The need for scrupulous cleanliness in the milking shed and dairy was amply and eloquently illustrated in this alcove in the Court.

The space on the right of the Dairy Alcove was devoted mainly to matters relating to herds and herd testing. A full range of scientific instruments in general use were on view. The space on the left was devoted solely to bacteriological specimens as they affect dairy products. As the importance of bacteriological influences in relation to this industry are becoming more generally recognised, a close study of these specimens proved intensely interesting and instructive to farmers and factory operators alike. The exhibit was neatly arranged and is complete in every detail.

STOCK EXPERIMENT STATION EXHIBIT.

The exhibit from the Yeerongpilly Stock Experiment Station was devoted largely to the subject of milk hygiene. Cultures of bacteria isolated from milk were shown and included organisms from inside the cow's udder; the hide of the cow; the air; flies; the milker; and milk utensils.

Plate cultures were used to demonstrate that sterilised utensils do not furnish any bacteria to milk. Samples of milk showing that if certain measures of strict cleanliness are adopted, it is possible to procure them from a healthy udder and which would keep indefinitely, were exhibited. Disease-producing germs which flourish in milk and come largely from human sources, namely typhoid and diphtheria bacilli, were displayed and were used as an object lesson on the necessity of greater care in the handling of milk. Undesirable germs, frequently present in milk, butter and cheese, some of which produce faults in flavour, texture, and colour, were also featured. Explanatory cards dealing with practical methods of prevention of mik contamination accompanied many of the specimens.

The necessity for the proper cleaning and sterilising of dairying utensils on the farm and in the factory was strikingly demonstrated by a series of plate cultures inoculated from rinsings from milk cans and other utensils.

Another section of this exhibit housed near the Meat Industry Hall illustrated the subject of Applied Bacteriology in relation to food preservation. It showed that modern methods of food preservation are processes the success of which depends on the total or partial elimination of bacterial life.

Samples of food preserved by heating, drying, smoking, salting, and otherwise, or by a combination of these processes, were exhibited. These processes were fully explained, and the effects demonstrated by plate cultivations. It was also emphasised by demonstration that all methods of food preservation largely depend on destruction or control of germ life.

The cattle tick problem and methods of control again received strong illustration, and the advantages and practicability of tick eradication were effectively brought under notice by means of official maps showing the progress of the tick eradication campaign in America. The latest return indicates that of the original 740,000 square miles of tick-infested country in 1906 in the United States, nearly 600,000 square miles have been cleared up, and the cattle released from quarantine restrictions.

Specimens illustrating the various prominent lesions of tuberculosis in animals, more especially pigs and bovines, were on view, and these were accompanied by explanatory cards indicating mode of infection and methods of prevention.

PLATE 102.—A CORNER OF THE COURT. THE VALUE OF THE DEPARTMENTAL HERD-TESTING SCHEME ILLUSTRATED.

Every farmer who hopes and works for better returns realises the necessity of increasing production by herd improvement.

PIG RAISING.

Though the display associated with pig raising in the Court was limited in extent, it was but one of half-a-dozen pig-raising displays in different sections of the Exhibition. In the Livestock and Meat Industry Hall, for instance, three alcoves were allotted to this industry—one, an extensive array of factory products for which there is ready sale both locally and interstate; one a display featuring pork other than the cured article; and one a selection of bacon pig carcasses classed as "Ideal" by the ham and bacon curers of Queensland. At the Pig Section, an instructive display featuring different grades of bacon, ideal and otherwise, was arranged; while the trade displays staged by the several bacon-curing establishments were both extensive and pleasing to the eye.

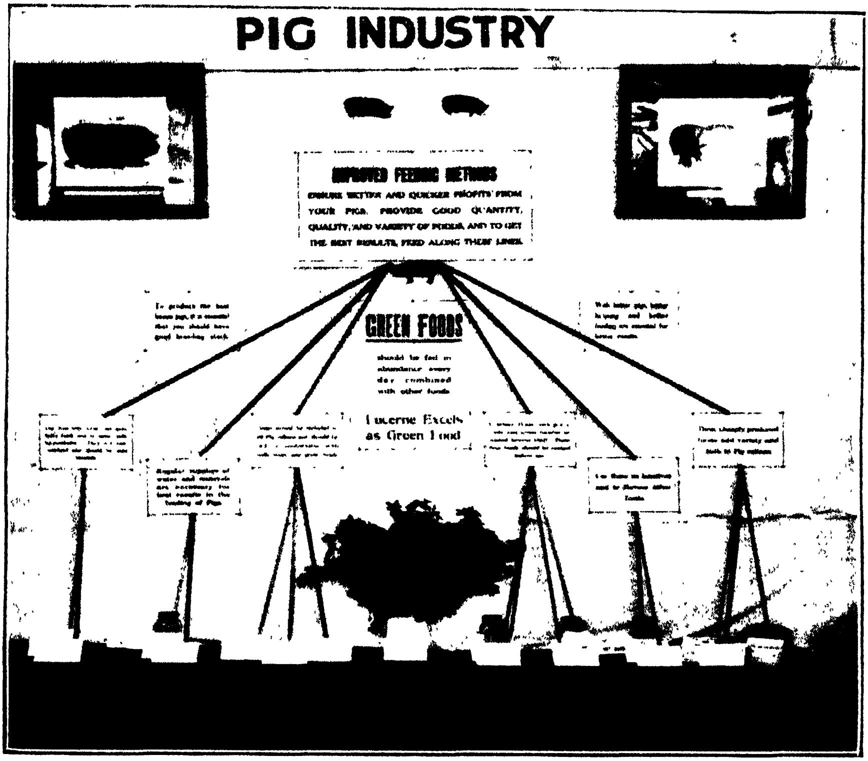

PIG INDUSTRY
IMPROVED FEEDING METHODS
ENSURE BETTER AND QUICKER PROFITS FROM YOUR PIGS. PROVIDE GOOD QUANTITY, QUALITY, AND VARIETY OF FOODS, AND TO GET THE BEST RESULTS, FEED ALONG THESE LINES.
To produce the best bacon pigs, it is essential that you should have good breeding stock.
GREEN FOODS
should be fed in abundance every day combined with other foods
Lucerne Excels as Green Food
Regular supplies of water and minerals are necessary for best results in the feeding of Pigs.

PLATE 103.

The Sound Educational Value of Departmental Work for the Pig-farmer was well Illustrated.

In the Agricultural Court the special points emphasised were Feeds and Feeding, a most necessary and important side of the pig farming business.

From an economic point of view, pig raising in this State is complementary to several other branches of farming, and production is increasing and quality is improving.

It was demonstrated that improved feeding methods ensure better and quicker profits from pigs, and the farmer was urged to provide food in good quantity, of good quality and variety in order to secure the best results. Green foods should be fed with a liberal hand every day, and the combination of these with other more concentrated foods was stressed, as also was the necessity for regular supplies of clean drinking water and mineral matters; while it was suggested that grain should be included in all pig rations and should be fed in combination with milk, roots, and greenstuff.

Samples of the foods were exhibited. Maize was stated to be Queensland's best grain for stock and a most valuable pig food, but only so when fed in conjunction with milk products, lucerne, and other nitrogenous foods.

PLATE 104.—AN ENTENTE CORDIALE—QUEENSLAND GETS A UNANIMOUS VERDICT.
Right: Hon. J. W. Blair (Chief Justice of Queensland); *Centre:* Hon. Harry F. Walker (Minister for Agriculture and Stock); *Left:* Hon. W. Forgan Smith (Leader of State Opposition).

Plate 105.—The Vice-Regal Escort. Troop of Queensland Mounted Police.

The Queensland Mounted Police is noted for the efficiency and all-round smartness of its expert horsemen. The horses are representative of the famous "Waler" type, so popular as cavalry chargers in Imperial and Dominion Armies. They were bred on the Government Remount Station in Central Queensland.

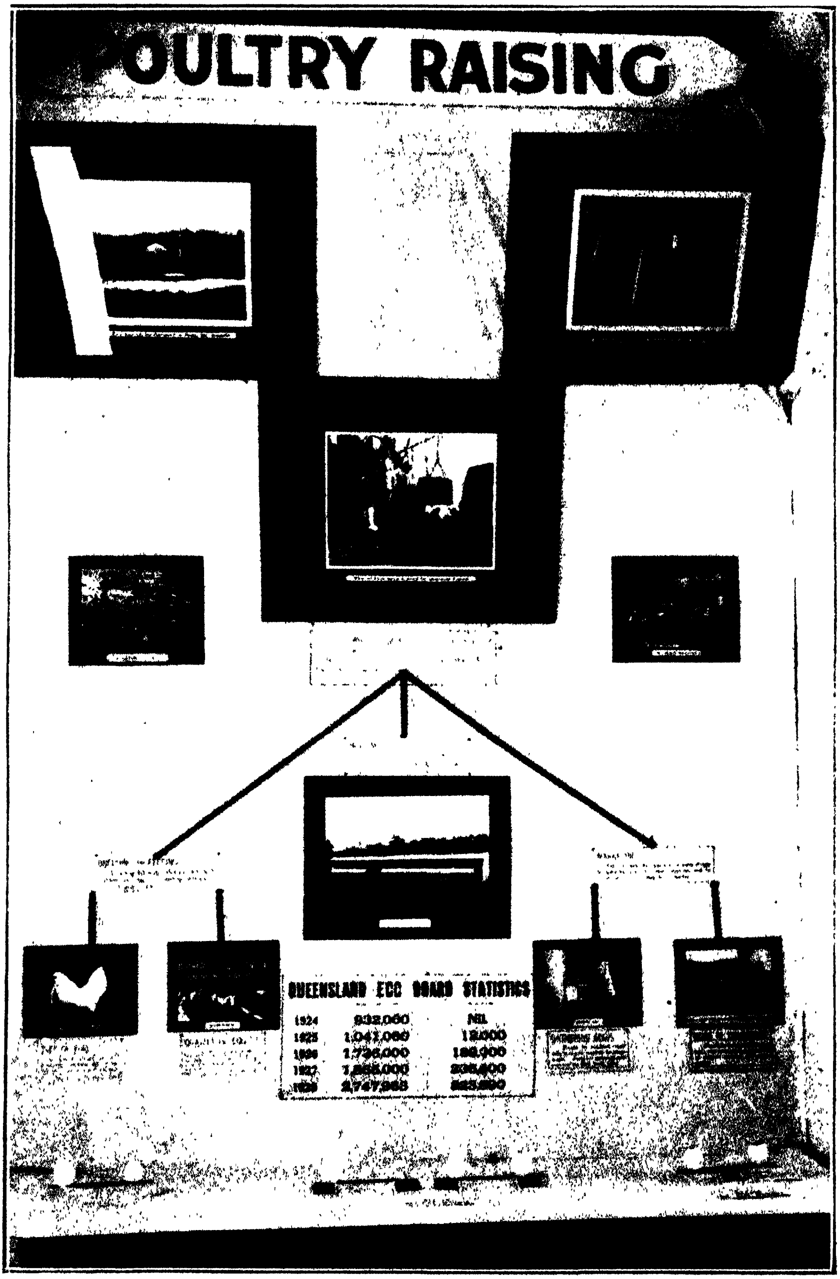


PLATE 106.—THE POULTRY PANEL IN THE COURT OF AGRICULTURE.

Poultry-raising is developing rapidly in Queensland, and has attained the status of a staple enterprise. Its annual value to the State is advancing towards £1,000,000.

POULTRY RAISING.

Owing to the extensive development that has taken place in the poultry industry during recent years and the necessity for exporting an increasing number of eggs from year to year, it was thought desirable in planning the Poultry Exhibit to try and bring before the poultryman the necessity of producing a greater percentage of eggs fit for the world's markets.

The expansion that has taken place was indicated by a few statistics relating to the operations of the Queensland Egg Board, which has been in existence for some years. There are only two methods by which this increase may be coped with; one is by an increased consumption and another by export. To obtain either, quality of the produce is essential, and the exhibit was designed with the object of pointing out to producers factors under their control which affect the quality of the product.

Poultrymen were reminded that attention to breeding and feeding, housing, and marketing are most important factors in production. Breeding, it was pointed out, not only has a definite bearing on the number of eggs a bird will produce, but also is largely responsible for the size of the egg. For profitable export it is necessary to have other things as well as size. The yolk of an egg should have a good colour; there should be no evaporation of the natural moisture contents, and the shell should be unsoiled. Cards and photographs indicated the directions in which producers should engage their attention with the object of retaining to the greatest degree possible the natural quality of the egg.

ENTOMOLOGY AND PLANT PATHOLOGY.

As in previous years the Division of Entomology and Plant Pathology staged an extensive exhibit dealing with the more important pests and diseases that come within its province.

The Entomological Branch of the Division was represented by an extensive series of thirty-four exhibition cases dealing with the life histories of fruit, vegetable, grain, cotton, and stock pests. Each of these cases contained a comprehensive series of water-colour sketches of the various stages through which the insects pass in their life cycles. In most instances typical specimens of the injuries inflicted by these pests were also illustrated. The value of the display was further enhanced by a large series of plant specimens, fruit, foliage, twigs, and roots, showing the actual insect damage. The water-colour sketches were the work of Messrs. I. W. Helmsing, E. Jarvis, and H. Jarvis. The exhibition cases displayed were in most cases based on original life history studies made by officers of the Branch.

An exhibition case of outstanding interest was that dealing with the sawfly associated with cattle-poisoning fatalities in certain of the pastoral districts. Important fruit pests dealt with were the Queensland fruit fly, the spiny orange bug, the codling moth, and the San José scale. The bean fly, which has been particularly destructive this year, was fully illustrated; and the moth that so frequently injures potato tubers in its larval stage was also adequately dealt with. Grain weevils and pea and bean weevils were important insects exhibited this year. Banana pests were also dealt with in three cases containing a comprehensive range of these insects.

A special panel of cases was used to illustrate matters of general entomological interest, and included therein were two cabinets containing the stomach contents of insectivorous birds, and demonstrated very effectively the economic value of many of our native birds.

The entomological exhibit was arranged by Mr. J. A. Weddell, under the supervision of Mr. Veitch, Chief Entomologist.

The Pathological Branch was again represented by a very extensive series of preserved plant specimens illustrating the commoner diseases of many of our important economic plants. Special attention was given to the diseases of bananas, tomatoes, and citrus; and a representative series of specimens illustrating flag smut of wheat, which has been abnormally prevalent on the Darling Downs during the past season, was also featured. A series of coloured illustrations of diseases was another valuable feature of the display. This section was arranged by Mr. R. B. Morwood, acting under the supervision of Mr. J. H. Simmonds, Plant Pathologist.

PLATE 107.
These panels, in the Departmental Court, were centres of attraction for producers and students

PLATE 108.—HOW QUEENSLAND FARMERS ARE SERVED BY SCIENCE.
The Valuable Work of the Entomologist and Plant Pathologist was well displayed in the Departmental Court.]

PLATE 109.—THE JOURNAL ALCOVE WAS A CLEARING HOUSE FOR DEPARTMENTAL INFORMATION. (MR. ERIC KEEHN IN ATTENDANCE).

SEEDS, STOCK FOODS, FERTILISERS, AND PEST DESTROYERS.

A small exhibit by the Seeds, Stock Foods, Fertilisers, and Pest Destroyers Branch of the Department of Agriculture directed attention to the legislation regulating the sale of these materials.

The Exhibition brought merchants and storekeepers from all parts of the State to Brisbane, and those interested in the sale of seeds for sowing, stock foods, stock licks, fertilisers, cattle and sheep dips, were advised to call at the Department of Agriculture and discuss with the Officer in Charge of the Investigation Branch some of the problems that arise in connection with these materials. All persons in any way connected with the sale or purchase of what may be called the farmer's raw materials would do well to apply for a copy of the extract from the Department's Annual Report dealing with this subject.

The impurities of frequent occurrence in stock foods and agricultural seeds were represented in the exhibit by a collection of ninety named weed seeds, from which is was possible for both merchant and farmer to identify some of these far too frequent impurities. The old saying that one year's seeding makes seven years' weeding is far nearer the truth than many think, as weed seeds do not always germinate during the first year. It is also possible to find dodder in lucerne paddocks as the result of dodder seeds carried by flood or by animals that have grazed over dodder-infested land. The one and only way to get rid of weeds that produce seeds is to prevent them from seeding; which is a matter in the hands of those who occupy the land.

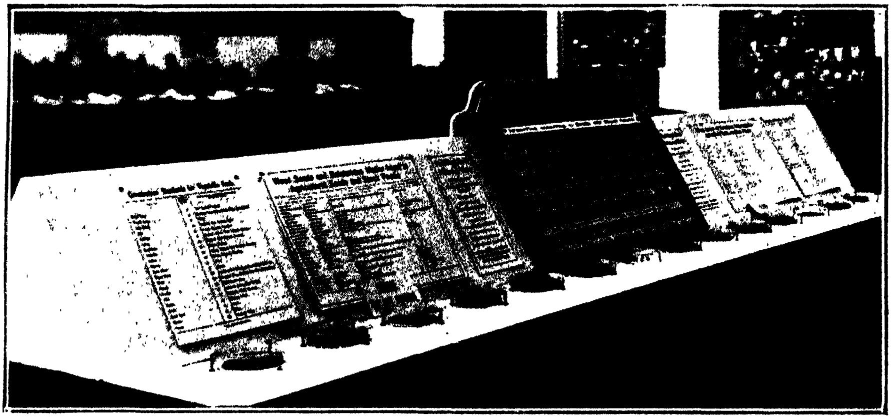


PLATE 110.—THE ECONOMICS OF AGRICULTURE IN SOME IMPORTANT PHASES WERE ILLUSTRATED IN THIS INTERESTING EXHIBIT.

From a card headed "Germination Standards for Agricultural Seeds" it was learnt that with the exception of Mauritius beans, Rape, and Mangel, the agricultural seeds used in Queensland are produced in Australia. Mauritius beans used largely in the sugar districts for green manuring are frequently of poor germination. Buyers would, therefore, be well advised to ascertain the percentage of germination before sowing. In the case of canegrowers or farmers buying seeds for their own sowing no charge is made; merchants or others selling seeds are charged the nominal sum of 2s. 6d. per sample.

For the guidance of those interested, printed cards set out both the accepted common and scientific names of many weeds of frequent occurrence, also the names of the materials in which they are usually found.

From the printed matter relating to vegetable seeds it was noted that Queensland's principal supplies are obtained from overseas; and for the information of buyers the minimum germination required for each kind was given.

Under the Stock Foods Acts all meals must be labelled setting out the minimum percentage of crude protein and crude fat, also the maximum percentage of crude fibre. A card in the exhibit gave the nutritive values of meals made from whole grain as compared with wheat by-products—bran and pollard. The Stock Foods Acts now include stock licks and mineral foods. A card entitled "Bone Meal and Rock Phosphates for Feeding Purposes" set out that definite standards have now been fixed for these materials. Roughly, all sterilised bonemeal must be of such fineness as to permit 95 per cent. by weight passing through an aperture of one twenty-fifth of an inch. Nauru phosphate must also be of such fineness as will permit of at least 95 per cent. by weight passing through an aperture one-hundredth of an inch. Buyers are warned that the ordinary bonemeal and Nauru phosphate prepared for sale as fertilisers are not suitable for feeding purposes. The amount of phosphoric acid contained in these materials must appear on the label. Pastoralists and others interested in the use of stock licks and mineral feeds are strongly advised to consult the Department and at all times refrain from the purchase of material not bearing the seller's guarantee. Particulars of the Acts' requirements were set out on a card in the exhibit.

The new system of grass land management was explained as making the most of young and short grass, which is of much better feeding value than grass that has begun to produce flowering stems. Young grass provides a ration that favours meat, milk, and growth generally, against old grass which, in some cases, barely provides for maintenance. Grass can be kept at its best by intermittent or rotational grazing and, on the coastal areas, by the application of a sufficient quantity of a suitable fertiliser which, in many cases, means sulphate of ammonia. Samples of the various kinds of sulphate of ammonia were exhibited. These included the ordinary quality manufactured by the Southern gasworks, which, unfortunately, is somewhat difficult in storage. The dry-neutral sulphate of ammonia with a nitrogen content of not less than 20.6 per cent. is a great advance in physical condition over the ordinary ammonium sulphate, and a sample of the new English product with a minimum nitrogen content of 20.6 per cent. was shown. This was well worth looking at, as the colour and fineness of Billingham sulphate of ammonia never varies. As soon as supplies of this material are available in commercial quantities, it is anticipated that a considerable reduction will be made in the Queensland price of ammonium sulphate. As canegrowers are by far the largest users, this reduction in price will be of material help. From the foregoing it will be seen that nearly every country in the world is drawn on for some of the supplies required by agriculturists.

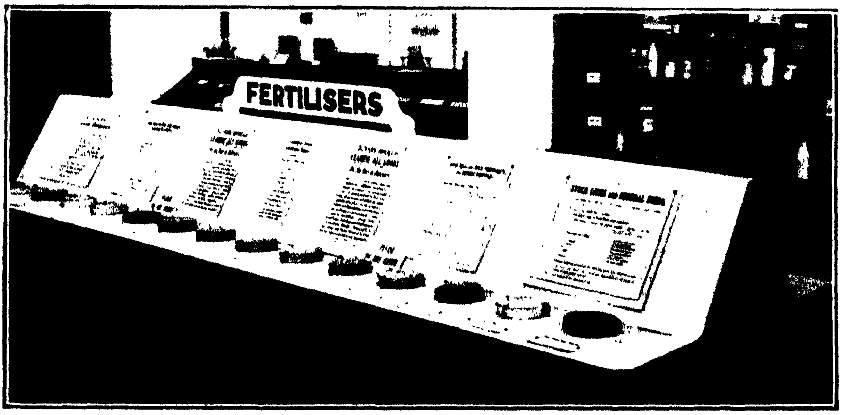


PLATE 111. -THE PURE SEEDS, STOCK FOODS, AND FERTILISER BRANCH HAD AN EDUCATIVE DISPLAY THAT ILLUSTRATED A VALUABLE SERVICE TO THE MAN ON THE LAND.

Fertilisers undoubtedly comprise by far the largest tonnage of prepared chemicals used on the land. They are not, however, the only ones, as both animal and plant life are subject to pests and parasites, causing untold losses to pastoralists, farmers, and others. These pests are fought and controlled by chemicals both inorganic and organic. The growing practice of supplementing feeding stuffs with mineral mixtures in most cases pays. The materials now used for these purposes are not only varied in character but great in quantity.

Until a few years ago the principal cattle dips, sheep dips, and other pest destroyers were imported from overseas. During the last two years an increasingly large quantity has been manufactured in Australia by manufacturers who have established works both in Queensland and in the Southern States for this particular purpose. Altogether this display, illustrating as it did new ideas and new methods, was most interesting to all engaged in land industries.

THE MEAT INDUSTRY.

AN EXCELLENT EXHIBIT.

IN officially opening the Meat Industry Hall at the Brisbane Exhibition, the Premier (Hon. A. E. Moore) said it as one of the finest exhibits that could be staged. He urged sheep and cattle growers to improve the quality of the stock so as to meet fierce international and interstate competition.

Mr. J. B. Cramsie (chairman of the Meat Industry Board of New South Wales), who recently returned from a world tour in the interests of the meat industry of Australia, said that it was the finest meat exhibit he had ever seen. He urged producers to organise, and he hoped the time would come when Australia would stand in the very forefront as the Argentine of the Pacific.

Mr. Ernest Baynes (president of the Royal Association), in welcoming the Premier, said the primary purpose of the display was to promote the interests of the live stock industry, and, although the association's activities in this direction were only two years old, he was confident that the great primary industries were awakening to the fact that the merits of their finished products would be better understood through exhibits of that nature.

PLATE 112.

The Spirit of Queensland was reflected in the Premier's smile.

Importance of By-Products.

Mr. Baynes explained that the main portion of the exhibit dealt with live stock as a source of food supply, but as meat production and the production of many other necessities of life went hand-in-hand, prominence also was given to the importance of by-products. Take the bullock, for example: If a 1,000-lb. live-weight bullock could be used for nothing but its food value there would be approximately 440 lb. of waste, and if this were not convertible into usuable products, either the producer would receive less for his animal, or the consumer would pay more for his food.

In the by-products exhibits they welcomed the co-operation of several Southern industries, particularly as they absorbed a large percentage of the live stock and of raw by-products produced in Queensland, but they also looked forward to the expansion of similar industries in Queensland, believing that it was an economically sound principle that manufacturing should be performed as nearly as it efficiently could be to the source of its raw material, which suggested that, in course of time, less live stock and less of the raw by-products should be shipped away from this State, and that manufactured products should be substituted. In these days food products could be given a wide distribution without the slightest deterioration in quality or wholesomeness. There were several other means of bettering the status of the live stock industry. One, the branding of carcass meat as a guarantee of quality; another, the attention that might be given to the nutritive value of the cheaper cuts of meat. A little demonstration of each of these subjects was included.

Mr. Baynes added that the finished products in the exhibit were particularly interesting to housewives. Producers of live stock should bear in mind that their final purpose was to produce beef, mutton, lamb, pork, or veal of a quality that would be attractive to the consumer. The exhibit dealt with the live stock industry as one unit rather than with any particular branch of it. Its different branches had different problems, and some very real ones.

PLATE 113.—A NOBLE PROFILE—HEAD OF THE CHAMPION HEREFORD, MR. S. N. INNES' HOBARTVILLE FOREST KING.

DAIRY CATTLE AT THE SHOW.

ILLAWARRAS.

THE Illawarra Milking Shorthorn breed was one of the largest on the entry list, and attracted most attention. The judge, Mr. James Young, of Raleigh, New South Wales, was particularly impressed with the aged cows and bulls, and he said the younger stock were certainly impressive.

The aged classes were particularly strong, and were in excellent condition. There was a very strong contest in the aged cows, 5 years old or over, in milk, and culling was rigidly adhered to. It was a most difficult job to make a selection. It was evident that the judge was impressed with Mr. A. T. Water's Favourite 2nd of Railway View, which annexed the blue, and at a latter period was proclaimed champion of the Illawarras. This beast was a rich red, and it may be here mentioned that the reds predominated throughout the section. The cow, 4 years old and under 5 years, in milk, was one of the prettiest classes the writer has seen for years, and speculation was high as to which would secure first honour. It was quite evident that Mr. J. Phillip's Myrtle 4th of Temor Grove caught the eye of a keen judge, and she secured the blue, with Mr. A. Pickles' Lady Kiama of Blocklands a close second. The younger classes began to come in, and great was the excellence. For cow, 3 years old and under 4 years, in milk, the first prize was captured by Mr. A. T. Waters' Fussy 5th of Railway View. The milking qualities of the aged cows was a revelation, and they were all in the pink of condition.

The more youthful females were a feature on their own, and bore striking evidence of care and well-chosen methods on the part of their breeders. The heifers, 2 years old and over 3 years, in milk, were of high class, and Ivo 2nd of Dnalwon, owned by Mr. A. J. Caswell, secured a well-merited blue ribbon with a runner-up of merit in Mr. A. Pickels' Lady Myrtle 2nd of Blacklands. For the cow, 5 years old or over, in calf or dry, competition was keen. Mr. R. A. Scott's Golden of Waverley shone out, and finally secured the first honour. For cow, 4 years old and under 5 years, with calf or dry, a spirited contest took place, and Mr. C. W. Heading's Red Rose of Headlands won. This was one of the most interesting classes of females. The heifer class, of 12 months old and under 18 months, attracted a particularly choice collection of excellent animals, with rich reds prominent, and a few beautiful roans. Mr. A. T. Waters, with his Favourite 8th of Railway, was again successful in annexing the first prize, with Mr. G. W. Reading's Irene 2nd of Headlands a well-earned second. There was a very fine exhibit of heifer calves, 6 months old aund under 12 months, and a little picture, named Mona 5th of Oakvale, owned by Mr. B. O'Connor, scored. The children's half class attracted considerable attention, and Miss F. Hickey had no trouble in scoring a first for a pretty little pearl called Primrose of Glendalough.

The showing of groups gave the general public an insight into the class composed of male and females, with their offspring, and probably no class was better suited for exhibition purposes. They were valuable, as well as beautiful to look at. The group of three cows, 3 years old or over, in milk, or dry, provided a rich class, and Mr. A. T. Waters came first, with Mr. A. Pickels second, and Mr. B. O'Connor third. The group of three heifers, under 3 years old, in milk, or dry, bred and owned by the exhibitor, caused a weighty and anxious time. The judge gave Mr. A. Pickels first, B. O'Connor second, and S. Henry third.

Probably no other show in the Commonwealth to-day possesses the splendid type of bulls that was seen here. Every beast posessed quality, and was in the pink of condition, but a few animals on the scraggy side should never have left the farm. There was a very keen contest when the bulls, 4 years old or over, were brought before the judge. The class was one of the largest of the day, and reds again predominated. Culling, it was noticed, was inevitable, and the bulls sent out looked as though they had no right to be there, for they certainly chewed their cuds. "Wonderful," was the comment of the judge regarding those which were left, and indeed they were more than wonderful, for they bore the stamp of quality, combined with stamina. All eyes were on Lord Kitchener of Werona, owned and bred by Mr. J. W. Johnston. This beast bore the aristocratic element of the great war general, being a massive, well-built animal, with a wonderful constitution. He not only secured the blue, but carried the championship of all the Illawarras at the show. Another well-ribbed sire, owned by J. H. Weber, Radiant of Greyleigh, a rich red, came a good second. For the bull, 3 years old and under 4 years, Mr. Charles Francis, with his Limelight of Culvallis, secured first; and a young and well-proportioned bull, owned by Mr. J. Phillip, called Jellicoe of Headland, of 2 years old and under 3 years, also annexed first place.

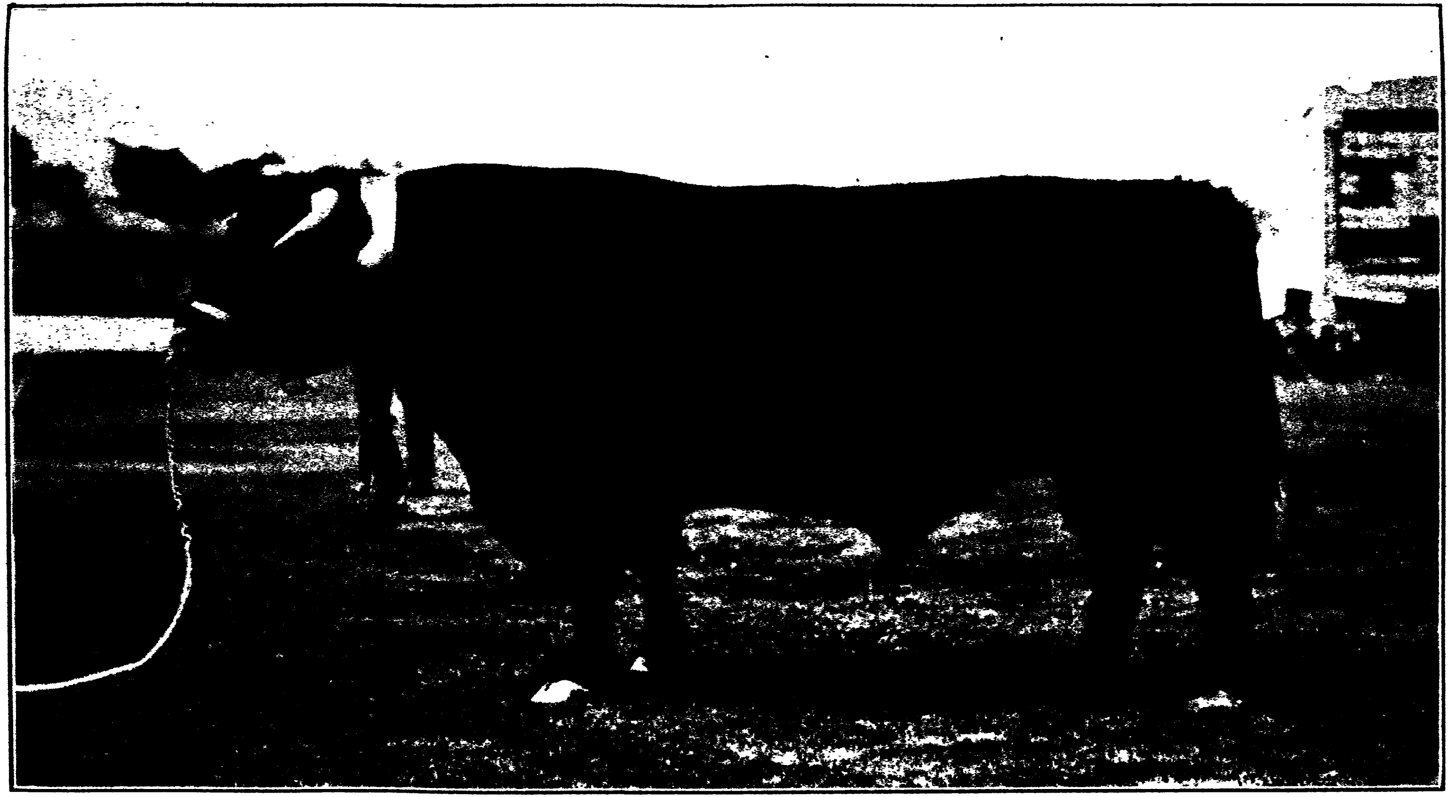


PLATE 114.

Milton's Tribesman 3rd, by Masterkey (imp.); dam, Milton's Elaine; Champion Beef Shorthorn Bull, Royal National Show, 1929. Bred by Mr. Anthony Hordern at his Milton Park Stud, Bowral, New South Wales, and exhibited by the Gindie State Farm (Mr. E. R. Ashburn, Manager).

One of the prettiest of the younger bulls on the ground was Mr. J. A. Montgomery's Renown of Mountain Home, in the class for 12 months old and under 18 months, and he won easily. It would not be surprising to find this splendid animal coming rapidly to the front in the coming years. The groups of the Illawarras were a special feature, and the sire and his progeny were a particularly handsome lot. Mr. James Farquharson came first; and in the breeders' group Mr. A. Pickels' exhibit showed up well. The sire's progeny stakes group had a hearty reception. Mr. B. O'Connor came first, and in the exhibitors' group Mr. A. Pickels was again successful.

THE JERSEYS.

Jerseys were well representative of the wonderful strides the breed has made in Queensland. The attendance was most marked during the judging period, and the awards were watched with keen interest. The judge was Mr. R. R. Kerr, of Yan Yean, Victoria, a very keen and observant man, and the general opinion was that his decisions were on the whole satisfactory. A general improvement in the preparation was noticeable. Mr. Kerr was particularly well pleased with the Jersey bulls, and, as he remarked, "this is the animal we are all looking for." There were quite a number of cattle in the ring of outstanding merit, but, on the other hand, remarked the judge, there were a few animals that should never have been led into a show ring. The Brisbane show of Jerseys promises to be one of the best in Australia, and it is well for breeders to adhere to that type of cattle which will command respect and add to the wealth of the farm.

The aged cows of 5 years old or over, in milk, were a particularly choice lot, and the judging was carried out with marked ability. It was evident that Messrs. E. Burton and Sons (Wanora), with their Oxford Golden Butter Cup, attracted the attention of the judge, for she secured not only the coveted blue, but was crowned champion Jersey cow for the day, with Mr. Joseph Sinnamon's Oxford Hazel second, and also reserve champion. There was a keen contest in the class of cow of 4 years old and under 5 years, in milk, and Mr. Joseph Sinnamon scored the coveted blue ribbon with his Trinity Gentle Lady. For cow, 3 years old and under 4 years, in milk, E. Burton and Sons, of Wanora, with their beautiful Oxford Ginger, came a good first. In the younger class of heifer, 2 years old and under 3 years, in milk, there was a fairly keen contest, and the result favoured Mr. Joseph Sinnamon, with his Trinity Columbine for first place, with W. Spresser and Son's Carnation Daisy a good second. For the heifer, 2 years old and under 3 years, in calf, the blue ribbon went to a smart little animal owned by E. P. Fowler and Son, in their Carlyle Larkspur. In the heifer, 18 months old and under 2 years, dry, Mr. T. A. Petherick won first place with his Trecarne Locket. For the heifer, 12 months old and under 18 months, dry, E. Burton and Sons again were first with their Oxford Gloria. The groups of Jerseys were particularly pleasing, and formed one of the best staged exhibits at the show. The groups of three heifers, under 3 years old, in milk, or dry, were a feature, and W. Spresser and Son came first, E. Burton and Sons (Wanora) second, and Joseph Sinnamon third. The bull, 3 years old and under 4 years, was won by Messrs. W. E. O. Meier's Cyclone of Woodstock, with a smart runner up in Mr. T. A. Petherick's Trecarne Sultan. For the aged bulls a very keen contest was waged, and Mr. W. W. Mallet's Trinity Darby secured first honour, and finally secured the championship of all the Jerseys. For the reesrve champion, Mr. T. A. Trecarne's Golden King was selected.

The younger classes came in for a severe test, and for bull calf, 12 months old and under 18 months, the first prize went to Mr. B. J. Jensen's Kelvinside Noble's Chieftain. As in other dairy breeds, the groups attracted attention, and for the sire and his progeny the positions were: E. Burton and Sons first, W. Spresser and Son second, and W. W. Mallet third. The breeders' group proved an interesting event, and was one of the most attractive in the ring. The placings were as follow:—E. Burton and Sons first, Joseph Sinnamon second, and W. Spresser and Son third. The positions were the same in the exhibitors' group. The sires' progeny stakes were a feature of the section. E. Burton and Sons secured first with progeny of Oxford Golden Noble, Joseph Sinnamon second, and E. Burton and Sons third with the progeny of Oxford Renown.

THE AYRSHIRES.

Next to the Illawarras as a utility class of dairy breed, the Ayrshires have a place, and it is something to be proud of for Queensland to have such a magnificent class of dairy stock to draw upon. Each year their grace and their spotted beauty add to the attractiveness of the show. All day long there was an interested and what may be termed an anxious expression on the faces of well-known breeders. The judge was Mr. John Buchanan, of Flinders, Victoria, a well-known Ayrshire man, quiet in demeanour, and with no frills. He went through his task in a manner most commendable. "They are a great lot," said Mr. Buchanan, "with a style hard to beat. The young stock were very good, although a tail was observable."

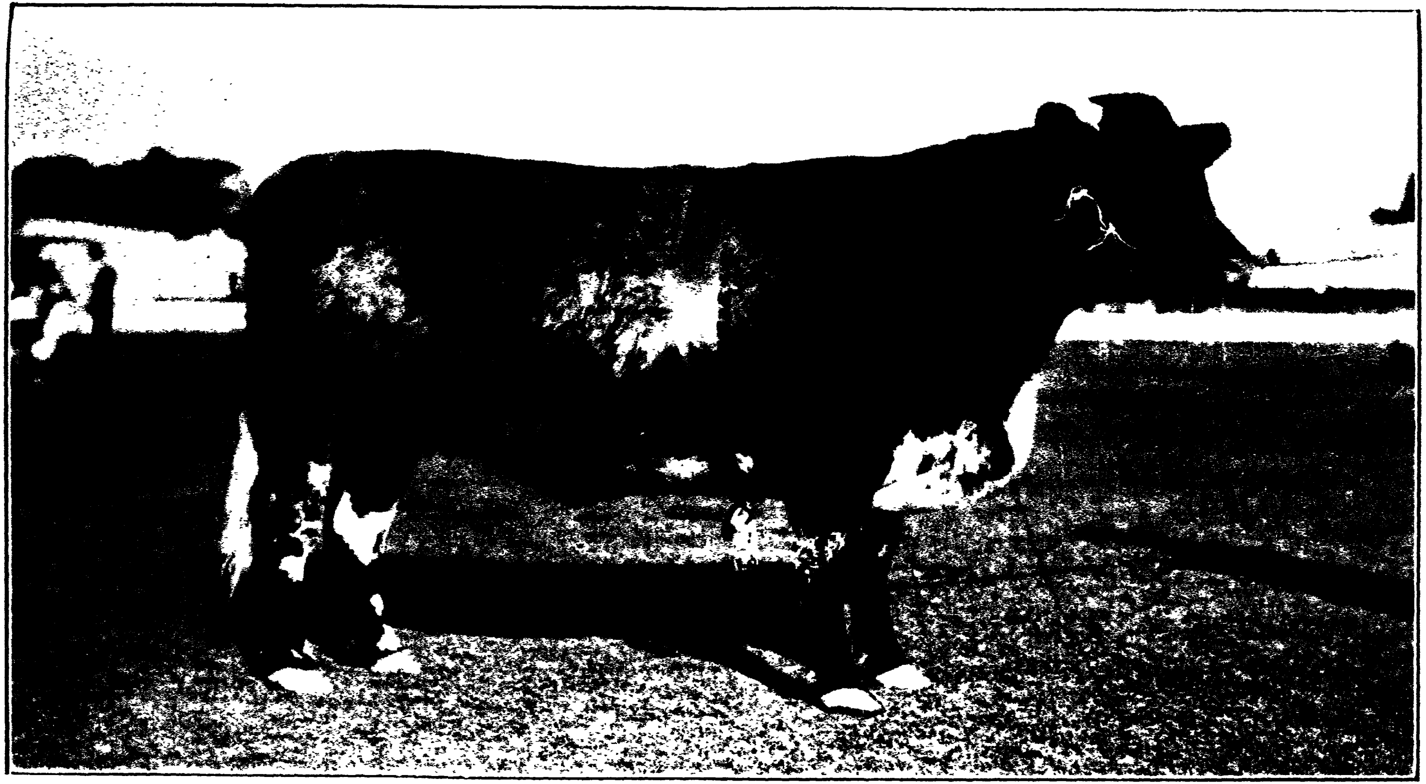


PLATE 115.

Actress 3rd of Milton, by Doone Monarch (imp.); dam Milton's Actress 2nd, Champion Beef Shorthorn female, Royal National Show, 1929. Bred by Mr. Anthony Hordern at his Milton Park Stud, Bowral, New South Wales, and exhibited by Gindie State Farm (Mr. E. R. Ashburn, Manager).

The females of the Ayrshires shone out in splendour, and their well-groomed coats and pretty spots were a relief. The contests as the day wore on were marked by a degree of keenness. The aged cow class, 5 years old or over, in milk, was a veritable picture. Mr. J. C. Mann's Beryl's Pride of Crescent Farm, was awarded first place, and also secured a well-merited championship. For the cow, 4 years old and under 5 years, in milk, Thomas Holmes' Longlands Tulip gained first place, with the same breeder's Longlands Isabel second. For the younger set of cows of 3 years old and under 4 years, in milk, Stimpson's Limited won easily with a very classy beast known as Benbecula Bellona. In the younger classes of females the stock shone out, and were in clean and well-kept condition. In the class heifers, 2 years old and under 3 years, Mr. Thomas Holmes won first place with his pretty little Longlands Marguerite. In the heifers, 18 months old and under 2 years, the first award went to Stimpsons Limited with a neat little animal known as Eleresley Mabel. The groups were very attractive, and gave the impression that the breed was being well looked after, and, as prominent Ayrshire breeders expressed it, they were a marvel of quality and beauty. The group of three heifers was particularly attractive, and the positions were as follow:—Thomas Holmes first, J. H. and R. M. Anderson second, and Stimpsons Limited third.

The aged bulls were a special feature of the show. For the bull, 4 years old or over, Stimpsons Limited came first with their Longlands Titus, and it will be remembered that this bull won the championship at the 1928 show. It was in the younger class of bulls that the keenest interest was manifested. For the bull, 3 years and under 4 years, Thomas Holmes' Claredale Bonnie Billy not only secured first place, but obtained the championship. The younger bulls were a fine lot, although a "tail" was noticeable in some classes. The competition for the bull, 2 years old and under 3 years, was interesting, and J. T. Knowles' Titus secured a first. In the class for bulls, 1 year old and under 2 years, Stimpsons Limited scored wth Eleresley Grand. The sire and his progeny stakes group was an excellent example of breeding, and Stimpsons Limited were successful with their Longlands Titus. The breeders' group was highly interesting, and once again Stimpsons Limited secured the honours.

THE FRIESIANS.

The Friesian classes created more interest this year than hitherto. The American records for milk probably added to the prestige, and it would not be surprising to see them becoming one of the most popular breeds of the State. They are big, upstanding cattle, with massive formation and great flank depth. They also possess plenty of bone, and when in prime condition would weigh well. The judge, Mr. V. J. Lamond, of Nowra, New South Wales, was one of the youngest judges yet seen on the Brisbane Show Ground, but his method of classification and his diligent research for quality were outstanding. The class was not one of the largest, and the judge soon got through with his work. He expressed pleasure at the quality presented, and he liked the dry cows. The aged cows were of a fine type, and Hickey and Son's College Princess Pontiac secured first position, and was also awarded championship. In the cow, 3 years old and under 4 years, in milk, Hickey and Son again scored a win. For the heifer, 2 years old and under 3 years, in milk, Mr. G. Newman's St. Athan Gypsy came first. For the younger set of females Hickey and Son scored again with their Stoneybrae Duchess. For cow, 3 years old and under 4 years, in calf, Mr. W. Richter's Oakland Hollyhock scored a first. The younger females were an attractive lot, although lacking in condition. In the heifer, 12 months old and under 18 months, the first prize went to C. Behrendorff's Inavale Maud.

The bulls were massive in construction, and looked well. The class for bull, 4 years old and over, was won by Messrs. D. Young and Son's Colossus of Stathan. It was in a younger class, however, that a champion was discovered, Mr. W. H. Grams' St. Athan Actuary carrying the championship. The groups were well contested, and the sires' progeny stakes group was won by Hickey and Sons with the progeny of Burnbrae Dumark Echo.

THE GUERNSEYS.

The yellow class of dairy stock Guernseys was the smallest section among the dairy breeds, but there appeared to be more interest shown this year than formerly. The judge was Dr. R. M. Kinross, of Ryde, New South Wales, who exercised great care in his determination. He said he was very pleased with the class presented, and stated that the class generally was true to type. The young females, he said, showed great promise.

Cows.—Four years or over, in milk: A. Cooke's Inglewood Butter Girl 1, A. Cooke's Minnamurra Eclipse 2, A. E. Gillespie's Caramana Polly 3. Three and under 4 years: A. Cooke's Inglewood Primrose 1, A. C. K. Cooke's Lynwood Beauty 2. Four years or over, in calf or dry: A. Cooke's Minnamurra Cherubine 1, A. E. Gillespie's Caramana Dolly 2, A. C. K. Cooke's Minnamurra 3. Three and under 4 years: A. E. Gillespie's Caramana Golden Lustre 2nd. Champion (cow or heifer): A. Cooke's Minnamurra Cherubine. Reserve champion: A. Cooke's Inglewood Primrose. Heifers: Two and under 3 years, in milk: A. Cooke's Belmont Bells. One and under 2 years: A. C. K. Cooke's Moongi Prairie Flower 1, A. Cooke's Lynwood Bracelet 2, A. J. Cranney's Lynwood Mignonette 3. Two years and under 3, dry: A. Cooke's Lynwood Generous 1, A. C. K. Cooke's Laureldale Fussy 2, A. C. K. Cooke's Laureldale Lucky 3. One and under 2 years: A. J. Cranney's Belmont Jasmine 1, A. C. K. Cooke's Moongi Sylph's Showgirl 2, A. E. Gillespie's Tanto Golden Lustre 3. Six and under 12 months: A. E. Gillespie's Tanto Pretty Polly 1, A. E. Gillespie's Tanto Dolly 2, A. C. K. Cooke's Laureldale Pixie 3.

Bulls.—Three years or over: A. E. Gillespie's Victor of Wollongbar 1, R. Mackie's Gatton Lochinvar 2, A. Cooke's Lynwood Royal 3. Two and under 3 years: A. E. Gillespie's Monarch 1, A. C. K. Cooke's Lynwood Flavour 2, A. Cooke's Caraman Barrister 3. Six and under 12 months: A. J. Cranney's Lynwood Royal's Laddie 1, A. E. Gillespie's Tanto Golden Langwater 2, A. Cooke's Lynwood Bounty 3. Sire and his progeny: A. Gillespie 1, A. Cooke 2. Exhibitor's group: A. Cooke 1, A. C. Cooke and A. E. Gillespie 2. One bull and two heifers: A. C. Cooke 1, A. Cooke 2, A. E. Gillespie 3. Champion of Queensland: A. E. Gillespie's Wollongbar Monarch. Reserve: R. Mackie's Gatton Lochinvar.

QUEENSLAND AGRICULTURAL COLLEGE.

WORK OF STUDENT FARMERS.

In the midst of the great display of the agricultural resources of the State at the Royal National Show was the exhibit of the Queensland Agricultural High School and College, which takes such an important part in their development. As usual it was highly instructive, and contained several new features, showing the work being done at Gatton, not only to teach scientific farming but in experiments of much value to agriculture.

This year the central feature dealt with poultry, an industry which returned £598,467 to Queensland in 1928. A brooder house, in which one hen can mother 150 chicks with the aid of a simple brooder made from two kerosene tins and four maize sacks, was shown. In a display of incubators the importance of heredity in the production of good producers was emphasised. As in the cattle industry, testing is of considerable value in poultry, and in single testing pens hens similar in conformation and appearance were shown with the great difference in annual egg production. In a model of a hygienic poultry house the whole structure is bolted so that it can be taken to pieces and cleaned in case of infestation by mites or ticks. The floor is made of concrete to facilitate cleaning and sanitation, and the perches are pivotted and grooved to aid in the destruction of ticks. Simple nests made of kerosene tins are easily accessible from the front of the house.

A cotton section was exhibited in conjunction with the Department of Agriculture and Stock. A pure strain of Acala cotton is being developed, and it already appears to be the most promising competitor of Durango cotton.

The horticultural section featured dehydration, with the assistance of a model of the stack type of dehydrator and forced draught recirculating dehydrator. The value of preserved fruit and vegetables imported into Australia annually is £436,000, and dehydration, it is pointed out, can help to keep much of this money in here and conserve surplus products. Banana flour manufacture is mentioned as an industry which should be practicable in Queensland to assist in stabilising the market for the fruit.

An illustration of the maize variety trial conducted by the college in 1929 showed experiments based on the system of randomised blocks arranged on a Latin square. It gives experimental results which overcome difficulties due to soil variation.

Experiments to determine whether top-dressing of pastures to increase the carrying capacity and correct mineral deficiency diseases in stock is advisable were illustrated.

In the dairy section attention was directed to the production of clean milk, and modern types of buckets, cans, filters, and other utensils and appliances were shown. As was the case last year, the desirability of fodder conservation for drought periods was stressed. A display of farm implements used by students at the college and a collection of photographs showing various activities there were on view, and the whole display was a very effective object lesson in the value of scientific farming and animal husbandry.

THE AWARDS.

"A" GRADE DISTRICT EXHIBITS—A KEEN CONTEST.

AFTER endeavouring to wrest the honours from competing districts in the "A" grade exhibits for the past eight years, Wide Bay and Burnett came into its own by triumphing over the North Coast and Tablelands of New South Wales. The margin was not great, only 12½ points separating these districts. The South Coast of Queensland was third.

An analysis of the points awarded to the respective districts reveals that the judging was evidently conducted on a conservative basis compared with previous years. For instance, Wide Bay and Burnett secured 170½ points for dairy produce last year, whereas the award on this occasion was only 145, despite the fact that its organisers were under the impression that they had made an improvement in this class. North Coast and Tablelands suffered a corresponding reduction, falling back from 189½ points to 149. In foods this district also showed a decided decline in points compared with last year, its 148 on that occasion dwindling to 127. Wide Bay held its own under this section, a result which applied to both districts in regard to fruits and vegetables. Wide Bay added 10 points for grains, while its rival slightly lost ground. Again in manufactures and trades the winning district made substantial headway, and both appreciably advanced in points for minerals and building materials. In other sections the figures fluctuated in some small degree, but, whereas North Coast lost ground for effective arrangement, Wide Bay progressed, and in the aggregate points reached 1,239 compared with 1,232 last year against North Coast's 1,226½ compared with 1,269 in 1928. The South Coast of Queensland made a brave showing and slightly improved its figures of last year by gaining 1,141½ points against 1,129. The win carries with it the coveted Chelmsford Shield, and the organiser of Wide Bay and Burnett (Mr. H. Bashford) and his co-workers were heartily congratulated upon their success. Details:—

—	Possible Points.	North Coast and Tablelands of N.S.W.	Wide Bay and Burnett District	South Coast of Queensland.
Dairy Produce—				
Butter	90	83	80	83½
Milk and by-products	40	20	5	10
Cheese	60	30	45	40
Eggs	20	16	15	12
Totals	210	149	145	145½
Foods—				
Hams and bacon	50	35	45	43
Rolled and smoked beef and mutton	20	12	18	18
Small goods and sausages	10	6	9	10
Fish, smoked, preserved, or canned	10	7	8	5
Canned meats	25	18	23	20
Lard, tallow, and animal oils	20	10	18	18
All butchers' by-products	10	6	8	9
Honey and by-products	20	19	18	15
Confectionery	10	8	6	6
Bread, biscuits, scones, and cakes	10	6	5	7
Totals	185	127	158	151
Fruits, Vegetables, and Roots—Fresh and Preserved—				
Fresh fruit	60	50	54	54
Preserved fruits, jams, and jellies	30	28	26	30
Crystallised and dried fruits	20	17	15	18
Preserved and dried vegetables	10	9	8	9
Fresh vegetables	20	18	14	18
Table pumpkins	6	6	4	5
Potatoes, English and sweet	40	29	30	32
Roots (including meals)	14	6	12	12
Cocoanuts, peanuts, &c.	10	7	7	3
Totals	210	170	170	181

DISTRICT EXHIBITS ("A" GRADE)—*continued.*

—	Possible points.	North Coast and Tablelands of N.S.W.	Wide Bay and Burnett District	South Coast of Queensland.
GRAIN, &c.—				
Wheat	50	44	30	22
Flour, bran, pollard, macaroni, and meals	10	5	8	5
Maize	50	44	37	32
Maizena, meals, starch, glucose, and cornflour	10	2	7	4
Oats, rye, rice, barley, malt, pearl barley, and their meals	30	22	18	14
Totals	150	117	100	77
MANUFACTURES AND TRADES—				
All woodwork..	30	25	30	30
All metal and ironwork	30	25	30	30
Leather and all leather work and tanning	20	18	19	19
Manufactured woollen and cotton fibre ..	30	27	24	25
Sheet metal work	10	8	10	8
Artificial manures	10	4	8	7
Brooms and brushes	10	6	5	8
Manufactures not otherwise enumerated ..	15	12	13	15
Totals	155	125	139	142
MINERALS AND BUILDING MATERIALS—				
Gold, silver, copper, and precious stones ..	25	22	20	..
Coal, iron, other minerals, and salt ..	30	20	26	12
Stone, bricks, cement, marble, terra cotta	20	18	20	20
Woods, dressed, undressed, and polished ..	25	20	25	20
Totals	100	80	91	52
TROPICAL PRODUCTS—				
Sugar cane	60	57	50	57
Sugar, raw and refined	20	13	18	9
Rum, other spirits, and by-products ..	10	..	8	8
Coffee, raw and manufactured, tea and spices	10	6	9	7
Cotton (raw) and by-products	30	23	28	25
Rubber	10	..	8	..
Oils (vegetable)	10	8	7	6
Totals	150	107	128	112
WINES, &c.—				
Wines	15	12	3	4
Aerated and mineral spa water, vinegar, and cordials	10	7½	7	7
Ales and stout	10	..	7	..
Totals	35	19½	17	11

DISTRICT EXHIBITS ("A" GRADE)—*continued.*

—	Possible Points.	North Coast and Tablelands of N.S.W.	Wide Bay and Burnett District	South Coast of Queensland.
TOBACCO—				
Tobacco (cigar and pipe) in leaf	20	14	15	16
HAY, CHAFF, &C.—				
Hay—Oaten, wheaten, lucerne, &c. ..	30	28	18	20
Hay in sheaf	5	2	3	4
Grasses and their seeds	10	9	6	8
Chaff—Oaten, wheaten, lucerne, &c. ..	50	44	32	40
Ensilage and cattle fodder	20	14	15	9
Sorghums and millets	10	8	7	6
Commercial fibres	15	12	12	12
Pumpkins and green fodder	12	9	7	10
Broom millet	10	7	8	7
Farm seeds	13	8	10	9
Totals	175	141	118	125
WOOL, &C.—				
Scoured wool	40	40	33	30
Greasy wool	60	60	45	30
Mohair	10	8	10	5
Totals	110	108	88	65
ENLARGED PHOTOGRAPHS	5	5	3	1
EFFECTIVE ARRANGEMENT—				
Comprehensiveness of view	20	14	19	16
Arrangement of sectional stands	25	19	20	21
Effective ticketing	10	8	7	8
General finish..	25	23	21	18
Totals	80	64	67	63
Grand Totals	1,585	1,226½	1,239	1,141½

SUMMARY OF POINTS.

Dairy produce	210	149	145	145
Foods	185	127	158	151
Fruits, culinary vegetables, roots	210	170	170	181
Cereals and by-products	150	117	100	77
Manufactures and trades	155	125	139	142
Minerals and building materials	100	80	91	52
Tropical products	150	107	128	112
Wines, &c.	35	19½	17	11
Tobacco	20	14	15	16
Hay, chaff, fodder, &c.	175	141	118	125
Wool, &c.	110	108	88	65
Enlarged photographs	5	5	3	1
Effective arrangement	80	64	67	63
Totals	1,585	1,226½	1,239	1,141½

"B" GRADE DISTRICT CONTEST.

The points awarded in the "B" grade district competition left no doubt as to the superiority of the Brisbane Valley, its keenest rival being Northern Darling Downs, which was 171½ points behind. Then followed Nanango, Kingaroy, Mount Larcom, and Oakey in the order named. Brisbane Valley's win is its fourth in succession, and the wide and varied nature of its resources has prompted the suggestion that it should be transferred to the "A" grade. A notable advance was made by Nanango, which moved up from fifth place last year to third position on this occasion. Details:—

—	Possible Points.	Oakey.	Brisbane Valley.	Nanango.	Northern Darling Downs.	Mount Larcom.	Kingaroy
DAIRY PRODUCE—							
Butter	90	83	82	82	83½	80	83
Cheese	60	55	57	50	58	..	53
Eggs	20	9	18	16	15	6	12
Totals	170	147	157	148	156½	86	148
FOODS—							
Hams, bacon, rolled and smoked beef and mutton	50	35	40	37	38	36	40
Fish—Smoked	10	2	7	3	3	9	..
Lard, tallow, and animal oils	20	15	18	15	17	15	18
Honey and by-products ..	20	8	18	13	14	12	16
Confectionery (home made) ..	10	4	8	6	7	8	6
Bread, scones, cakes, and biscuits (home made)	10	6	7	5	6	6	6
Totals	120	70	98	79	85	86	86
FRUITS, VEGETABLES, AND ROOTS (Fresh and Preserved)—							
Fresh fruits	60	30	52	32	32	40	30
Preserved fruits, jams, and jellies (home made) ..	30	19	27	26	24	26	21
Crystallised and dried fruits (home made or dried) ..	20	12	18	15	16	15	14
Preserved and dried vegetables	10	7	9	7	8	9	8
Fresh vegetables	20	14	18	12	14	16	10
Table pumpkins, squashes, and marrows	6	6	5	5	4	4	4
Potatoes, English and sweet ..	40	16	38	30	18	24	28
Roots and their products ..	14	6	11	8	10	7	6
Cocoanuts, peanuts, and other nuts	10	5	8	6	7	3	8
Vegetable seeds	10	5	6	8	5	4	7
Totals	220	120	192	149	138	148	136
GRAIN, &c.—							
Wheat	50	45	30	28	33	28	35
Flour, bran, pollard, macaroni, and meals	10	3	2	6	6	5	4
Maize	50	41	39	37	35	30	48
Maizena, meals, starch, glucose, and cornflour	10	2	4	4	7	6	8
Oats, rye, rice, barley, malt, pearl barley, and meals ..	30	19	27	21	25	25	23
Totals	150	110	102	96	106	94	118

DISTRICT EXHIBITS ("B" GRADE)—*continued.*

—	Possible points.	Oakey.	Brisbane Valley.	Nanango.	Northern Darling Downs.	Mount Larcom.	Kingaroy.
WOODS—							
Woods, dressed, undressed, and polished	25	7	25	21	14	12	10
Wattle bark	15	3	15	6	4	3	12
Totals	40	10	40	27	18	15	22
HIDES (1) AND HOME PRESERVES—							
Skins for domestic use ..	15	14	14	14	15	15	15
TROPICAL PRODUCTS—							
Sugar-cane	60	4	25	12	6	11	8
Coffee, tea, and spices ..	10	..	8	4	5	7	6
Cotton (raw) and by-products	30	20	27	25	23	26	24
Totals	100	24	60	41	34	44	38
MINERALS—							
Gold, silver, copper, and precious stones	25	..	15	12	12	22	14
Coal, iron, and other minerals, and salt	30	15	20	15	15	16	15
Totals	55	15	35	27	27	38	29
TOBACCO—							
Tobacco (cigar and pipe) in leaf	20	14	17	15	14	13	16
HAY, CHAFF, &c.—							
Hay—Oaten, wheaten, lucerne, &c.	30	18	28	17	18	21	21
Hay in sheaf	5	3	3½	3	2½	4	2½
Grasses and their seeds ..	10	5	9	7	6	9	7
Chaff—Oaten, wheaten, lucerne, &c.	50	32	47	28	30	28	30
Ensilage and cattle fodder ..	20	..	16	10	15	14	15
Sorghums and millets in stalks	10	5	8	9	6	6	6
Commercial fibres, hemp, and flax	15	3	12	8	5	6	6
Pumpkins and green fodder ..	12	7	10	8	6	11	6
Broom millet	10	6	8½	6½	6½	6	7
Farm seeds	13	11	11	11	7	10	6
Totals	175	90	153	107½	102	115	106½

DISTRICT EXHIBITS ("B" GRADE)—*continued.*

—	Possible points.	Oakey.	Brisbane Valley.	Nanango.	Northern Darling Downs.	Mount Larcom.	Kingaroy.
WOOL, &c.—							
Scoured wool	40	20	25	20	20	30	20
Greasy wool	60	50	30	40	60	45	40
Mohair	10	4	9	7	9	7	6
Totals	110	74	64	67	89	82	66
ENLARGED PHOTOGRAPHS	5	3	5	2	3	1	2
LADIES' AND SCHOOLS WORK AND FINE ARTS—							
Needlework and knitting ..	25	9	25	12	14	14	8
School needlework	5	1½	4½	3	3	1	1
Fine arts	5	3	3	3	5	5	5
School work—Maps, writing, &c.	10	8½	7½	9½	8	7	5
Totals	45	22	40	27½	30	27	19
EFFECTIVE ARRANGEMENT—							
Comprehensiveness of view ..	20	14	18	16	18	18	16
Arrangement of sectional stands	25	19	21	16	15	16	15
Effective ticketing	10	6	8	7	6	7	6
General finish	25	18	23	19	19	19	16
Totals	80	57	70	58	58	60	53
Grand Totals	1,305	770	1,047	858	875½	824	854½

SUMMARY.

Dairy produce	170	147	157	148	156½	86	148
Foods	120	70	98	79	85	86	86
Fruits, vegetables, roots	220	120	192	149	138	148	136
Cereals and by-products	150	110	102	96	106	94	118
Woods	40	10	40	27	18	15	22
Hides and home preserved skins ..	15	14	14	14	15	15	15
Tropical products	100	24	60	41	34	44	38
Minerals	55	15	35	27	27	38	29
Tobacco	20	14	17	15	14	13	16
Hay, chaff, fodder, &c.	175	90	153	107½	102	115	106½
Wool, &c.	110	74	64	67	89	82	66
Enlarged photographs	5	3	5	2	3	1	2
Ladies' and school work and fine arts	45	22	40	27½	30	27	19
Effective arrangement	80	57	70	58	58	60	53
Totals	1,305	770	1,047	858	875½	824	854½

ONE FARM.

THREE EXCELLENT ENTRIES.

Giving the dweller of crowded suburban streets a comprehensive insight into the manifold activities of the farmer's daily life and the wealth he wrests from furrow and field, the one-farm exhibits were one of the most instructive features of Brisbane's annual festival. Three magnificent exhibits were displayed in the pavilion this year, and fourteen judges were engaged in the arduous task of adjudication.

The winner was found in W. D. Ponton (Tuggerah) with 467 points; J. T. Whiteway (Buderim) was placed second with 427½ points, and J. Beck (Stanwell) third with 421 points. Details:—

——	Possible Points.	J. T. Whiteway.	J. Beck.	W. T. Ponton.
Produce—				
Butter	25	21	20	20
Eggs	5	1½	3	5
Totals	30	22½	23	25
Oods—				
Hams, bacon	20	16	17	18
Corned, other meats	10	5	4	4
Honey and by-products	15	11	8	9
Beeswax	5	3	3	3
Bread, scones	5	4	3	3
Confectionery and sweets	5	4	..	4
Home cookery	7	6	4	4
Lard, tallow, &c.	5	4	3	4
Totals	72	53	42	49
Fruits, Vegetables, and Roots—				
Fresh fruits	25	22	15	20
Preserved fruits, jam, and jellies	15	13	12	14
Crystalised and dried fruits	10	8	7	9
Preserved and dried vegetables	15	12	9	14
Fresh vegetables	15	12	11	13
Table pumpkins	10	7	5	9
Potatoes, English and sweet	20	7	13	16
Cocoanuts and nuts	7	6	3	2
Vegetable seeds	5	3	2	5
Roots, all kinds	15	8	5	12
Home made meals	3	3	3	½
Totals	140	101	85	114½
Grain, &c.—				
Wheat	25	4	7	15
Maize	25	19	14	23
Barley, oats, &c.	20	4	9	19
Home made meals	10	7	7	7
Totals	80	34	37	64
Tropical Products—				
Sugar-cane	30	15	14	8
Cotton in seed	20	14	19	16
Coffee	6	3	4	5
Totals	56	32	37	29

ONE FARM—*continued.*

——	Possible Points.	J. T. Whiteway.	J. Beck.	W. D. Ponton.
TOBACCO—				
Tobacco leaf	10	6	8	7
HAY, CHAFF, &c.—				
Hay	20	7	13	17
Hay in sheaf	5	3	4	5
Grasses and seeds	10	6	8	7
Chaff	20	12	17	10
Ensilage	15	3	13	3
Cattle fodder	15	11	12	12
Sorghum and millet	10	6	6	9
Broom millet	10	6	9	6
Farm seeds	7	6	5	6
Flax and hemp	10	10	6	7
Totals	122	70	93	82
WOOL—				
Greasy	20	15	16	14
Mohair	5	3	5	5
Totals	25	18	21	19
DRINKS, &c.—				
Home-made beverages	15	13	10	7½
WOMEN'S AND CHILDREN'S WORK—				
Needlework and knitting	10	9	4	4½
Fine arts	5	3	2	5
Fancy work	15	7	10	4
School work, maps, writing, &c.	5	4	3	2
School needlework	5	1½	4	3
Totals	40	24½	23	18½
MISCELLANEOUS ARTICLES OF COMMERCIAL VALUE	10	10	8	8
PLANTS AND FLOWERS, IN POTS, AND GARDEN SEEDS	6	6	1	2½
TIME AND LABOUR-SAVING ARTICLES	10	10	2	4
EFFECTIVE ARRANGEMENT—				
Comprehensiveness of view	10	7	8	9
Arrangement of stands	10	8	7	9½
Effective ticketing	5	2½	3	4½
General finish	15	10	13	14
Totals	40	27½	31	37
Grand Totals	656	427½	421	467

ONE FARM—*continued.*

——	Possible Points.	J. T. Whiteway.	J. Beck.	W. D. Ponton.
SUMMARY.				
Dairy produce	30	22½	23	25
Foods	72	53	42	49
Fruit, vegetables, roots	140	101	85	114½
Cereals and by-products	80	34	37	64
Tropical products	56	32	37	29
Tobacco	10	6	8	7
Hay, chaff, fodder, &c.	122	70	93	82
Wool	25	18	21	19
Drinks, &c.	15	13	10	7½
Women's and children's work	40	24½	23	18½
Miscellaneous articles of commercial value ..	10	10	8	8
Plants and flowers, in pots, garden seeds ..	6	6	1	2½
Time and labour-saving articles	10	10	2	4
Effective arrangement	40	27½	31	37
Totals	656	427½	421	467

Plate 116.—The Vice-regal Visitors were Keenly Interested in the Judging.

In the picture are Lord Stonehaven (congratulating a successful exhibitor); Sir John Goodwin, Mr. H. S. Cribb, and Mr. Ernest Baynes.

MILKING TESTS.

RECORD ENTRIES FOR AUSTRALASIA.

Certainly an Australasian record for entries was created this year in the big milking contests at the showgrounds.

Messrs. L. F. Anderson (senior herd tester) and A. Hossack (herd testing officer) of the Department of Agriculture and Stock said that tremendous interest had been taken in the contests by all the breeders. Although no records in production had resulted, the standards generally had been well maintained.

In the heavyweight milk class the highest yield was produced by Mr. A. J. Caswell's Rosie IV. of Greyleigh, the amount for the twenty-four hours being 76.9 lb. of milk. Although this is not a record for the Brisbane showgrounds, the figures were specially good, as the cow was above the standard.

The same cow also gained the championship for butter production on the ground, providing 2.774 lb. of butter fat for the twenty-four hours. This fine cow is well known on many showgrounds in the State, and her big victories are all the more meritorious in view of her age.

Messrs. E. Burton and Sons' Jerseys put up some fine performances and scored several successes.

Cow, four years old or over, averaging the greatest daily yield of butter fat for 48 hours. Points for lactation period being conceded.

——	Total Yield Milk, lbs.	Total Yield Butter Fat 48 hours.	Average Yield Butter Fat 24 hours.	Points.	Lact. Points.	Total Points.
A. J. Caswell's Rosie IV. of Greyleigh (I.M.S.) ..	153·8	5·5481	2·7740	44·38	Nil	44·38
A. T. Waters' Favourite II. of Railway View (I.M.S.) ..	147·1	5·0782	2·5391	40·63	2·7	43·33
W. M. Krause's Jennie IV. of Greyleigh (I.M.S.) ..	102·8	4·3602	2·1801	34·88	5·0	39·88
Cow, four years or over, averaging the greatest yield of butter fat for 48 hours.						
A. J. Caswell's Rosie IV. of Greyleigh (I.M.S.) ..	155·8	5·5481	2·7740	..	..	..
A. T. Waters' Favourite II. of Railway View (I.M.S.) ..	147·1	5·0782	2·5391	..	..	..
A. J. Bryce's Jewell II. of Rosemount (I.M.S.) ..	123·2	4·9271	2·4635	..	..	..
Cow, three years and under four, averaging the greatest daily yield of butter fat for 48 hours. Points for lactation period being conceded.						
J. Phillip's Evelyn of Sunnyview (I.M.S.)	149·0	4·9209	2·4604	39·7	Nil	39·37
T. G. O'Mears' Belle III. of Royston (I.M.S.) ..	83·5	3·6075	1·8037	28·86	10·0	38·86
A. J. Caswell's Model of Dnalwon (I.M.S.) ..	118·7	4·5038	2·2519	36·03	Nil	36·03
Cow, three years and under four years, averaging the greatest daily yield of butter fat for 48 hours.						
J. Phillips' Evelyn of Sunnyview (I.M.S.)	149·0	4·9209	2·4604	..	..	..
A. J. Caswell's Model of Dnalwon (I.M.S.) ..	118·7	4·5038	2·2519	..	..	..
Hickey and Son's Bella VI. of Thornleigh (I.M.S.) ..	114·0	4·0048	2·0024	..	..	..
Heifer, under three years, averaging the greatest daily yield of butter fat for 48 hours; Points for lactation period being conceded.						
A. J. Caswell's Ivo II. of Dnalwon, (I.M.S.) ..	93·5	3·6728	1·8364	29·38	6·8	36·18
E. Burton and Son's Oxford Daffodil (Jersey)	82·7	4·3963	2·1981	35·17	Nil	35·17
E. Burton and Son's Oxford Model (Jersey)	68·7	4·1803	2·0901	33·44	Nil	33·44

MILKING TESTS—*continued.*

Heifer under three years old, averaging the greatest average of butter fat for 48 hours.

—	Total Yield Milk, lbs.	Total Yield Butter Fat 48 hours.	Average Yield Butter Fat 24 hours.	Points.	Lact. Points.	Total Points.
E. Burton and Son's Oxford Daffodil (Jersey)	82·7	4·3963	2·1981	..	..	..
E. Burton and Son's Oxford Model (Jersey)	68·7	4·1803	2·0901	..	..	..
R. Mears' Sadie II. of Mordon (I.M.S.)	106·7	3·9399	1·9699	..	..	..

Jersey cow or heifer, any age, averaging the greatest daily yield of butter fat for 24 hours.

E. Burton and Son's Oxford Daffodil	82·7	4·3963	2·1981	..	..	..
J. F. Burnett's Fanny of Rosehill	88·7	4·3367	2·1683	..	..	..
E. Burton and Son's Oxford Model	68·7	4·1803	2·0901	..	..	..

Martin Snelling prize for the dairy cow producing the greatest quantity of butter fat in 273 days.

J. Phillips' Evelyn of Sunnyview, 567·62.

Hickey and Son's College Princess Pontiac, 534·24.

W. Spressor and Son's Carnation Lucy's Locket, 503·92.

Cow yielding the largest supply of milk in 48 hours under Babcock test.

A. J. Caswell's Rosie VI. of Greyleigh, 153·8 lb.

J. Phillips' Evelyn of Sunnyview, 149·0 lb.

A. T. Waters' Favourite II. of Railway View, 147·1 lb.

Royal National Champion butter fat test for purebred cow or heifer averaging the greatest daily yield of butter fat for 48 hours.

A. J. Caswell's Rosie VI. of Greyleigh (I.M.S.), 44·38 points.

A. T. Waters' Favourite II. of Railway View (I.M.S.), 43·33 points.

DISTRICT FRUIT CONTEST.

The Palmwoods fruitgrowers were jubilant on winning the prize for district fruit competitions, for which there were seven entries. Montville secured second position, and Woombye the third prize. Details:—

—	Possible Points.	Buderim.	Cooran.	Gayndah.	Montville.	Palmwoods.	Redlands.	Woombye.
Bananas	35	29	34	..	27	31	24	29½
Pineapples	35	32	23	..	30	35	33	35
Citrus	35	22	15	31	32	31½	28	27
Custard apples	10	8	6	..	8	8	10	5
Papaws	10	7	7	3	9	8	10	8
Strawberries	10	7	6	..	7	9	8	6
Other fruits	10	7	6	3	7	8	8	8
Grading and packing in export classes	35	28⅓	21½	11	29⅙	31	29⅔	29⅔
General display	20	16½	14½	17	17	18	13⅙	16½
Totals	200	156⅚	133	65	166⅙	179½	163⅚	164⅔

PINEAPPLE AND BANANA SHIELDS.

The Woombye fruitgrowers secured the shield offered for the display of pineapples, and Cooran again secured that for bananas. Particulars of the awards are as follows:—

PINEAPPLES.

—	Canned for Export.	Quality.	Grading.	Packing.	Total.
Possible points	30	42	14	14	100
Buderim	25½	24	10½	11	71
Cooran	23	20	6	7	56
Montville	25½	12½	9	8½	55½
Palmwoods	30	32	11	11	84
Redlands	26½	32	13	13	84½
Woombye	30	33	13	13	89

BANANAS.

—	Quality.	Grading.	Packing.	Total.
Possible points	50	25	25	100
Cooran	40	22	23	85
Palmwoods	37	22	21	80
Woombye	37½	20	20	77½
Buderim	33	22	22	77
Montville	34	19	17	70
Redlands	32	20	15	67

FRUIT PACKING.

CHILDREN'S COMPETITION.

A class in the district fruit exhibition of paramount interest to the school children concerned was the children's fruit-packing competition, which carried with it the McDonald Shield, awarded each year for the highest average points. The competitors must be past or present pupils of the fruit-packing classes conducted by the Department of Public Instruction. Out of nine entries received this year there were only four State schools competing—viz., Buderim Mountain, Flaxton, Montville, and Palmwoods. These competitors were children who are now attending the packing classes, and are not more than 14 years old. There was also another class for past and present pupils of packing classes over 14 years and not exceeding 17 years old. In this class there were three State schools competing—two entries from Buderim Mountain, two from Flaxton, and one from Palmwoods. In connection with the latter competition, only one competitor (Palmwoods) had complied with clause 4 of the regulations, which reads:—"Packing to be diagonal plan; one case to be packed with wrapped, the other with unwrapped oranges." In the other class, for pupils at present attending the fruit-packing classes, not one of the four competitors had complied with clause 4, and the fact should be noted by those concerned that each school loses 100 points through not complying with the conditions laid down. The neglect in this regard is unfortunate, as the organisers of this important class consider that the packing this year was, on the whole, the best packing so far seen in connection with this competition, and the task of the judge in deciding which school should be entitled to retain the much-coveted McDonald Shield for the next twelve months was a difficult one. The cases of oranges were certainly admirably packed, notwithstanding that they were not packed diagonally, as laid down in the regulations, and the juvenile competitors are bidding fair to become useful members of the fruit distribution and packing associations in their respective districts later on.

PIONEER DROVERS.

Mr. S. E. Pearson, of Camberly, Greenmount, Queensland, writing to the Editor of the "Pastoral Review" (July) on the subject of the article on Pioneer Drovers —reprinted in the Journal from "The Review" in the last issue—adds these interesting notes:—

I have read with much appreciation Mr. Wilfred Steele's article on Pioneer Drovers in the current issue of "The Review." All that he says is true. We still have many good drovers in Queensland, such as Dick Haynes, of Longreach, and Charlie Gallagher, of Hughenden—men who have spent all their lives on the road with stock—but the day of those long-distance trips is over.

Alfred Giles, who was so well known in the Northern Territory, and who might justly claim the honour of having accomplished the longest and most successful journey with stock in Australia, was a brother of Ernest, the explorer. Splendid men those Giles brothers!

The writer was among those who left the Victoria River with the exodus of cattle that took place in 1904. The season was good throughout the interior during that year, and close upon 40,000 head of cattle must have left the Territory. Alexandria, Brunette, and other tablelands runs also sent cattle south that year.

Blake Miller and "Jumbo" Smith, each with 1,000 Victoria River Downs cows, bound for Queensland, broke the trail for the long column of cattle marching east. Following them came J. R. Skuthorpe with 3,000 Wave Hill bullocks, and behind him Charlie Phillott with 3,000 Wave Hill cows, all bound for Killarney Station, Narrabri, New South Wales. Steve Lewis followed with another 1,000 bullocks from Buchanan's Wave Hill Station, bound for Adelaide, via Newcastle Waters and Alice Springs.

Blake Miller led the way across the Murranji Desert to Newcastle Waters and Anthony's Lagoon, and a great bushman and unerring pilot he proved to be. Each morning at daybreak he speared his cattle into the eye of the rising sun, and we followed on his track across the waste for 400 miles.

The cattle that Smith and Miller brought from Victoria River Downs were destined for Austral Downs, and Blake Miller managed that property for Sir Sidney Kidman up till the time that it was purchased by C. J. Brabazon.

The writer left Skuthorpe's cattle at Austral Downs and pushed on to Adelaide via the Birdsville-Hergott track, reaching Hergott Springs on the same date that Steve Lewis arrived with his 1,000 bullocks from Wave Hill, via Alice Springs. Two thousand bullocks—1,000 each from Augustus Downs and Lorraine Stations, on the Leichhardt River—reached Hergott from Queensland at the same time, and were offered for sale there along with the Wave Hills.

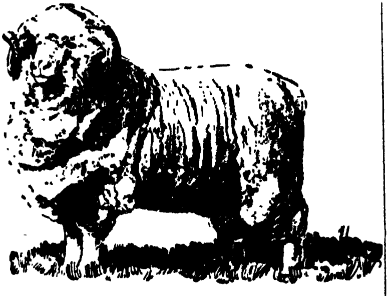
What a muster of well-known cattlemen there was that day on the saltbush plain that spreads between the township and the Frome River! The late John Barker (of Barker Bros., Adelaide) auctioned the cattle from the vantage point of a buckboard drawn up on the plain. All around grazed 3,000 bullocks, dappling the sunlit landscape with their many-coloured hides. W. F. Buchanan (brother of Nathaniel, the grand pioneer who had done so much for Northern Australia) was there to see his cattle sold; and Sidney Kidman, who bought most of them, had fewer grey hairs in his beard then than he has now.

Wilfred Steele, who was with Steve Lewis, mentions that 95 miles was the longest dry stage that their cattle had on their march across the continent; but Steve (a brother of the Hon. John, M.L.C., who at that time owned Newcastle Waters Station) told the writer that he considered his cattle had accomplished one stage of 108 miles without water. It was in June of that year, and cool weather, else they must have perished. Nevertheless, 60 per cent. of Lewis's cattle were fit for the butcher when he delivered them at Hergott Springs.

The following year Walter Rose went out to lift 4,000 head of Lumley Hill's Lissadell cattle, and he had a terrible time getting back to Queensland. The writer was in Camooweal the day that Rose's plant passed through on its way to Western Australia. In the interim drought had closed the Murranji track, and Rose was forced northward through the Delamere country to the Roper River. He was two and a-half years on the road back to Queensland.

During recent times the indomitable old Walter has been keeping a hotel at Cloncurry. Jack Skuthorpe took up a skelp of country in the Northern Territory, off the head of the Nicholson River, in 1907, and died there of Gulf fever shortly after. Charlie Phillott (brother of Edward, of Colane, Winton) settled in the Charleville district, and has done well.

RESULTS are the Final Test



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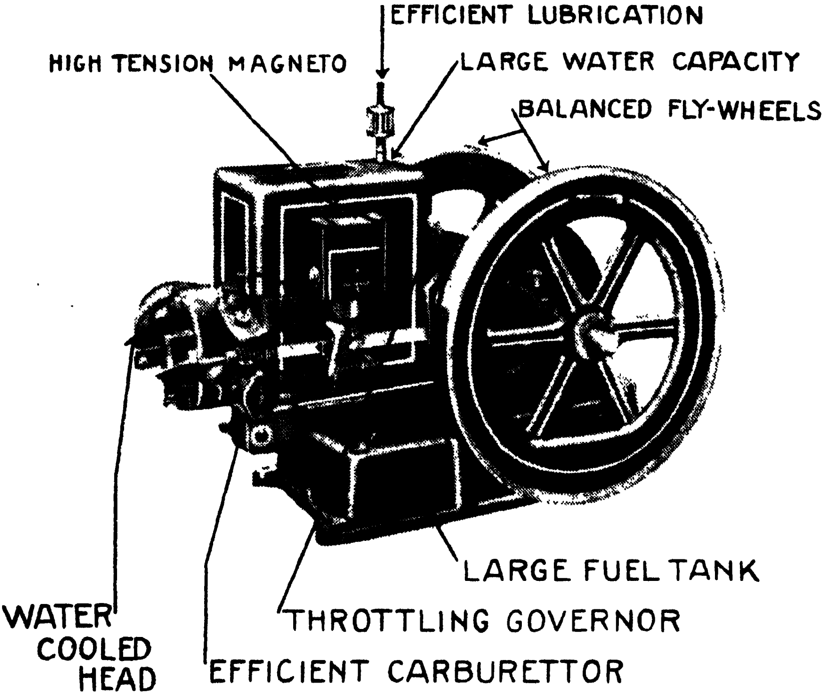

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THE CULT OF THE COLT.

By "U9L."*

THE PERFECT HACK.

BEFORE leaving the matter of breaking and handling it mightn't be out of place to devote a minute or two to what constitutes the perfect hack.

Exception might be taken to the use of the word "hack." Almost it is right that fault should be found. A hack is usually associated with the show ring, and these fellows to which I refer may never see a ring in their lives. They're the boys, though, that take us there and bring us back, that carry us long miles under the baking sun and on moonless nights, when not a glimmer of light is to be seen. They carry us over country that would break the show ring champion's heart and our neck, and they take us through scrub at a gallop through which the other fellow couldn't see daylight. These are the horses on which we do our daily work, who wheel cattle and slug after sheep. In fact, and in short, they're just ordinary station horses who prop up the country from behind without ever getting the cheers of multitudes or sharing the limelight. You know them, and I know them, and we both love 'em.

A Good Horse must be Easy to Catch and Lead.

The first point to consider is the catching. The perfect horse must be easy to catch anywhere at all—in the yard among others, in the open among his mob, and anywhere at all. He should present his head for capture and stand still while the bridle is being slipped on him. Of course, I know that many jewels of horses are rogues to catch. A perfect camp horse, when the cattle are on camp, may take more wheeling than a good intention. But that's only a form of perverted humour on the part of the old fellow. He knows what's on, and I honestly believe he's laughing to himself all the time while he evades our clumsy efforts to get him. For mine own part I make rather a hobby of catching my horses by putting my hand on their rumps first. I know it's silly, but I do it, and I've ridden some peerless gems of horses. It's a spirit of camaraderie, I think, which prompts an approach in that fashion. Anyway, it's wrong, and the fault is mine, not the horse's.

A horse that lugs on the bridle when being led is not, and cannot be, perfect. It should step free behind you—abreast of you for choice—and it should come willingly wherever you elect to go.

"Morally Tied."

It should stay put wherever and whenever you decide to leave it. If it's only tied by a string, that bit of twine should be sufficient to hold it in its place. If it does break away, then it should take but the few steps which the shock has prompted and then halt and stay still. By the way, when breaking in it's a good plan to use a bridle with a long pair of reins. At every opportunity drop those reins on the ground and go and leave your charge. He won't take many strides after his fancied release before he treads on those reins and snags his mouth. The first few lessons may achieve little, but in a remarkably short time that colt understands with the reins lying on the ground virtually he's tied to a post. And it has the same moral effect, too! I've seen a mob of bush horses race by a little mare of mine who was standing with the reins dangling. All she did was to call to them as they passed and pivot on the spot to which she was morally tied.

Play the Game Fair.

In the exercise of saddling and mounting I want you to understand that when I say a horse should stand still I mean it only within reasonable limits. A little bit of a step, or an impatient stride or two, shouldn't condemn a horse. Hang it all, put yourself in that fellow's place and imagine his keenness. Think to yourself how you sometimes want to get to a job and irk at the delay. That fellow doesn't mean any harm when he wants to move before you're ready, and instead of swearing at him for his impatience just curse your own dilatory actions. Play the game fair, even if it is only with a horse. A bit of a stride while you're mounting, though it's not in the lexicon of perfection, isn't any harm so long as that stride swings towards and under you. It's when the horse swings away from you that you want to check him, and mind your own P's and Q's as you mount.

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*In the "Pastoral Review" for July, 1929. Previous notes by the same interesting and well-informed writer were reprinted in the March, August, October (1928), January, February, March, April, May, and June (1929) Journals from the February, April, May, July, September, October, December, (1928), January, February, and May (1929) numbers of the "Pastoral Review."

Having mounted, and without worrying about with which foot the horse leads, let us consider paces. Some people run away with the idea that hacks are born. Some believe in heredity. Others give the balance of power to environment. We're not going to argue now, but I firmly believe that, while heredity has its influence to a certain extent, hacks are made by the man who rides them. Let me quote the following in support of my statement. I've broken mobs, and I've ridden multitudes off the breaker's hands. Absolutely without exception every horse I rode exclusively from the breaking was a good and fast walker. And let me whisper my shame, almost without exception they cantered like unto a three-legged trestle in action! I don't know how it was done, and I don't know what means I employed to that end. I did it unconsciously, therefore I can take no credit to myself, and neither should I shoulder the blame.

Paces Aren't Everything.

If you'll accept that lot we'll proceed. But paces aren't everything, though many people run away with that idea. Keep your perfect pacer, and give to me a horse that's responsive in the mouth, that reads your lightest whim and interprets your wishes with accuracy. A pacer may carry you in comfort, but the other fellow is with you in spirit and body, and at the end of the day that twain are better physically than the former disunited units.

And level with that paragon I'd place the horse that goes straight! There's a charm about this, a delight and a pleasure that many men miss. You'll see a horse, otherwise perfect in all his paces, that wants the whole road to himself. He'll waddle and shuffle and lug to this side and that, and he can't go straight. That's an abomination and a curse. I can't tell you how to cure a horse so afflicted, and I doubt there is a remedy. But I can tell you a preventive, or, rather, the cause of the trouble. It is brought about by the rider hanging on to the horse's head when he's a colt. He won't give the thing a free rein and let it go easy, and the colt learns to chafe against the leaden hold by waddling. That's the cause. You may sense the preventive for yourselves.

A Straight Goer.

A horse that goes straight is one of the first considerations of perfection. Many people run away with the idea they want a twister and a dodger for scrub riding. That's an erroneous myth. If you get a horse that props and doubles, that isn't game to go straight, then you and that horse are going to part company--you'll be impaled on one bough and the horse will be lying at the bottom of the tree. Above everything else, a scrub horse must be able and game to go straight. He's got to swing and swerve, of course, and often he's got to be so nippy that his shadow's got to move lively not to be left behind. But he must be able to go straight. That twisting business is learned later; the ability to go straight is the keystone of the job.

Now let us have a look at this horse's paces. It goes without saying that a horse should have easy paces, springy, and with a movement that denotes a joy of life. That's a pleasure for both parties—the mount and the rider. But an essential for perfection is that the horse must be able to hold that pace whatever it is. For instance, you're riding along, the reins hanging free, and your horse is walking. He knows, and you know, the peculiar little action by which you urge him to another pace, be it trot or canter. But while that horse is walking he mustn't break. Force him as much as you will, that horse retains that particular pace until the magic signal is given which indicates a trot or canter. That sort of thing shows training on the part of the man and an ability to assimilate that training on the part of the horse. Though it's only a little thing, a horse shouldn't break when crossing a gully or creek. Yet how many times will you see it hold its pace? Please don't forget the ability to go straight—that's particularly an essential if you head your mount across the downs and ride at ease.

The Intelligent Mount.

The next thing necessary, and please understand I'm placing these objects at random and without any given order of precedence, is that the mount must take an intelligent interest in where it's going and what it's doing. Often you'll find horse and rider in perfect communion one with the other. The man knows the point at which he's aiming, and by a dozen and some more indications does the horse express a similar knowledge. That's a pleasure to the rider, and anything which adds to his ease and comfort helps to form perfection in his mount. Such a horse takes note of where it's going. It doesn't put its feet in holes and blunder over tussocks. It may deviate round a rough place, and when past that obstruction it'll shake its head, prick its ears, and pick up the line again. Doesn't that make a man feel a pride in his mount? Doesn't that let him know he's not riding a slave? And doesn't that, or shouldn't it, give him pleasure?

Some horses are born turners, some acquire the art, and some come a crash. We must have a horse capable of turning in a flick of time and a dash of space. He must keep his legs under him and have perfect command of himself while he does it, too. There's only one way—he must turn on his hind legs. He must gather his hind legs under him, sit on his hocks, as it were, and wheel as if on an axle. When he's done that he's in a position to spring off his tail and not lose a speck of pace. Horses that prop and wheel on their front legs seem to have a notion that they're ideal turners, and won't learn any other way if they're set at all in that forward turn. They take a pride in it, and there's a fall following that pride in the near future. A horse may be taught to turn properly by pulling him back on his haunches and swinging him round. That requires a strong hand on the rein and a herculean grip with the thighs. But it can be done, and it's worth while.

Tripping, shying, stumbling, and other abominations are disqualifying points. Though most men attempt corrective measures, as well it is to blow against thunder as try and cure those faults.

A Horse Among Horses.

And last, though by no means least, our horse must be able to carry us. When the sweat's caked about his ears, and his breath comes in panting sobs, when his nerves and sinews are shivering from exhaustion, and his throbbing heart pounds against the calves of your legs, then must our mount hold his head high, prick his ears, take a fresh hold of the bit, and see you damned before he'll submit to the weariness which envelops him. Yea, then you have a horse among horses, and truly you're accursed for ever if you don't dismount, throw your arm round the little fellow's neck, and walk beside him for a mile or two to ease his tired muscles and aching body.

PLATE 117.—THE KING OF THE RING.

RURAL LIFE IN OTHER LANDS—IV.

By the EDITOR.*

A JOURNEY TO GERMANY.

In this series it is proposed to confine our consideration more to national customs and to the economics of agriculture, rather than to cultural methods, for systems of husbandry in Europe, except as regards general principles, are more or less governed by local conditions and traditions—consequently much of what one was able to observe, in the course of a visit to Germany, after the war, in the way of field practice would be, I think, quite inapplicable to Queensland. With us, generally speaking, the conditions of country life are so different that there would be nothing gained by a dissertation on German methods of farming, but on the economic side the German farmer has made much noteworthy progress, and in view of the closer attention that is being given to agricultural economics in Queensland to-day, it is thought that a brief review of several points in rural economy that impressed rather forcibly an ordinary observer, preceded by a fleeting impression of a post-war journey from London to Germany by way of the old A.I.F. road, may be of some small interest.

The Charm of London.

There is a magic and charm about London that one realises fully the moment he is leaving after some months of residence—a residence long enough to enable one to become fully conscious of the fascination of the Empire's centre.

The scene at Victoria Station was in marked contrast to those to which one had become accustomed at the end of his periodical ten days' leave during the years of war. There were no pathetic little family groups gathered round returning "Tommies," no kiddies saying good-bye to fighting fathers, perhaps for the last time, and no wives and no mothers smiling through their tears and demonstrating so quietly, and with such dignity, the wonderful bravery of the women of wartime England. There were no groups of casual Australian "Diggers" with ready though judicious retort to their natural enemies, the military police. Instead one found himself with a delicious sense of freedom in his "civvy" clothes, with not a uniform in sight except those of the policemen and railwaymen on duty. Then, on that sunlit summer morning came the journey by comfortable Pullman down through Kent, the garden of England, to Folkestone. How different from that first rail ride to Folkestone—the midnight rush by troop train from Amesbury through a driving snow storm across the south of England, then in the grip of the 1916 winter; the marshalling by leather-lunged but very efficient sergeant-majors on the ocean front parade of the old town that led down to the cross-channel boat, berthed at the breakwater. Outside was a steel-grey tumbling sea misted by showers of sleet, and a raw, cold gale blowing up Channel.

A Contrast.

This time, in all the glory of a bright summer day, the Channel was as smooth as the Boat Passage leading from the river to Moreton Bay, and the crossing to France as pleasurable as the journey from Brisbane to Bribie on a windless spring morning. The coast of France was soon in sight, and then came into view the old familiar column of Napoleon's monument on the heights above Wimmereux, and shortly afterwards we glided quietly past the old breakwater and to the well-remembered Boulogne Quay. Here again one felt the contrast of the new order of peace. After passing through the Customs one could do what he liked. There was no yarding up by irritable transport officers, no military police to demand a pass, no toiling up the old via dolorosa—the way of sorrows and backaches—to the hungry camp on One Blanket Hill. After looking around on the old familiar sights, all one had to do (with no one to tell him how to do it and when to do it) was to board the tourist train for Paris. How luxurious its first-class compartments when compared with the old cattle trucks, "Chevaux 8, hommes 40"—that is to say, their capacity was eight horses or forty men—on which we used to make the journey back to the line; trucks on which every bolt had rattled loose and which seemed to travel on square wheels over a track that apparently had a bottom step at every rail joint. Veritably peace hath its victories!

From Piccadilly to Picardy.

From Boulogne to Amiens the way was through very familiar country. The sea was in sight again at Etaples, the rails running along the shore on the border of the great war cemetery among the fir-forested sand dunes that are lapped lazily by the never ending wave wash of tidal waters. Across tide-bared flats could be seen again the towers and gables, and the flaming red roof of the Casino of Paris Plage—the mecca of many "Diggers" when Etaples was the great training ground—or "bull-ring" as they called it. Abbeville, the old-world shell-shocked city, so well remembered by Australians, was the next halt; and from there on the way led up through the elm-shaded, wonderfully green valley of the Somme, past our old back-area resting places, on to Amiens, the old battered city on the gates of which the invaders knocked in vain in the wonderful and strenuous spring and summer of 1918, and now regaining some of its former prosperity. Here we elected to stay awhile, to renew old memories (and what memories!) and old acquaintances. It was a happy reunion.

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*In a Radio Talk through 4QG.

From Amiens it was decided to continue our journey to Germany in a round-about way by car, over the old Somme battlefields to Mons, and thence by train to Charleroi, to Liege, and on to Rhineland, crossing the Belgian border near Aix-la-Chapelle. Over the roads as familiar to us as the road to Redcliffe, through country filled with haunting memories—a country now of blue, green, and scarlet enamel, splashed with red poppies and blue cornflowers, now scarred and desolate, showing deep wounds that even Nature, in all her wonderful artistry, could not camouflage successfully; through Villers-Bocage to Contay, and thence down the Hallue Valley through Behencourt, Frechencourt, to Querrieux, and thence once more on the cobbled road to Albert. How every detour in our route was welcomed!—to Blangy-Tronville, Daours, Corbie, Villers-Brettoneux, Mericourt, along the Somme through Bray to Peronne, and back again through Lagnicourt, Bullecourt, Noreuill Gully, Vaulx, and down to Bapaume. It was an old, old journey from Piccadilly to Picardy.

We must hasten on, though one is tempted strongly to linger by the way. When one passes an old tumble-down sandbag stronghold which one had helped to build in the days when sandbags seemed to be the most precious things on earth, the temptation to talk of old times and present contrasts becomes almost irresistible.

The Road to the Rhine.

By easy stages, over old fighting areas, past old front-line "possies" and camping grounds, through Bapaume and Arras, Mons was reached, and from there our journey to Germany through Charleroi, Huy, and Liege, country already very familiar, was continued by rail. After crossing the frontier the way led through Aix la-Chapelle over level plain lands on to Cologne, our temporary destination. The country, in some respects, reminded one of the Darling Downs, though, beyond its more or less featureless, level expanse, it was difficult to define the points of resemblance it vaguely suggested.

Germany is a very interesting country geographically. South Germany consists of the Alpine foreland from Lake Constance to the Valley of the Inn, a tributary of the Danube. In the west the frontier follows the crest of a mountain range, and along the Valley of the Moselle for some distance, and then runs roughly north. In the east it is more definitely physical, and is determined by the Bohmer Wald and other ranges, and the mountains beyond the Oder. Then it crosses a featureless plain in an irregular line trending somewhat to the north-east. South Germany thus consists of the Central Highlands, and North Germany of the plain to which they slope. In the east the winter is severe, while in the west it is comparatively mild. The Rhine basin has mild winters and early springs. The summer climate of North Germany is very much that of the Thames basin, both have an average July temperature of just over 62 degrees Fahrenheit. South Germany is warmer.

Magnificent forests cover the mountains of South Germany and parts of the northern plain, in all about one quarter of the surface of the country. About one half is under cultivation, the most fertile being the Upper Rhine country, the garden of Germany. Here the vine comes to perfection, yielding famous wines.

Much wheat is grown on this great plain, but in most other parts rye is the chief cereal. Potatoes are grown in enormous quantities in Northern and Central Germany. The sugar beet is an important staple in some districts. Hops are grown chiefly in Bavaria.

We may have spent overmuch time along the road, but as the way led through country that will be ever sacred to Australians, perhaps an apology for lingering so long is unnecessary. In the next lecturette of this series we will continue a hurried journey from the Belgian border to Cologne, down the Rhine to Dusseldorf and up that famous river to Mayence, and then lead on to a consideration of some aspects of agricultural economy that have interested the German farmer who, in this phase of farming, has accomplished some sound and striking results.

SOILS.

Summary of a lecture by Mr. G. J. Saunders, M.Sc., B.E., A.A.I.C., Principal of the Ipswich Technical College, at the June Pig Farmers' School, at the Queensland Agricultural High School and College, Gatton.

The name "soil" is applied to the soft portions of the earth's crust produced by the weathering of rocks. Soils fall into one of two classes—(*a*) Derived from the solid rock immediately underneath, or (*b*) transported from one place to another by agencies such as the wind, running water, or even glaciers.

A soil of the first class passes gradually through the subsoil and rotten rock to the solid rock, and its composition is directly related to the parent rock, whereas the composition of a transported soil shows no such relation.

All rocks are divided into three main classes—(*a*) Igneous, (*b*) sedimentary, (*c*) metamorphic. Igneous rocks are those which have been formed by the solidification of molten masses derived from within the earth—e.g., granite at Stanthorpe, basalt on the Darling Downs.

Sedimentary rocks have been formed by the weathering of pre-existent rocks and the consolidation of the weathered material—e.g., sandstone around the College, and the shales of the Ipswich district. Metamorphic rocks are those that were originally igneous or sedimentary, but have been changed so that their original characteristics have been altered or even entirely effaced—e.g., the Brisbane schist in and around Brisbane.

Igneous rocks are subdivided into—(*a*) Plutonic, (*b*) volcanic, (*c*) hypabyssal. Plutonic rocks are those which have been formed by the cooling and solidification of the molten mass or magma within the earth's crust; such rocks cool slowly, and their mineral constituents are coarsely crystalline—e.g., granite (Stanthorpe).

Volcanic rocks have been formed by the solidification of the magma upon the earth's surface. These rocks are not always connected with volcanoes—e.g., at Vesuvius—but may be formed from the magma which has poured out quietly through cracks on to the earth's surface—e.g., the Deccan in India. Rocks of this type are finely crystalline to glassy—e.g., basalt (Darling Downs) trachyte (Fassifern district and the Glass House Mountains), rhyolite (Esk).

Hypabyssal rocks have been formed from the magma which has cooled very close to the earth's surface in cracks (dikes), &c.

The agencies by which the rocks are converted into soil are rain, frost, changes in temperature, wind, running water, and glaciers. Rain falling through the air dissolves from it small amounts of oxygen and carbon dioxide. When it falls on the rocks, it not only softens clayey portions and washes them away, but it attacks chemically the hard solid parts converting them into new compounds, some of which may dissolve in the water.

Water in changing to ice increases in volume and exerts a very great pressure. When a rock, the upper surfaces of which is saturated with water or which contains water in cracks or joints, is subjected to very low temperature, the water freezes to ice and exerts a powerful wedge-like action. This breaks the surface down into finer parts and widens the cracks and joints, enabling air and water to penetrate to greater depths. By repeated action the solid rock ultimately crumbles away and will eventually form soil.

Where a rock is exposed to great extremes in temperature, we find that they crack and fall to pieces. This is due to the fact that the different minerals of the rock expand unequally when heated by the sun's rays during the day and contract at different rates when they become cooled during the night.

Wind by itself has very little action on rocks, but, when it picks up particles of sand, it becomes a very abrasive agent. The wind also transports the light materials to other localities.

Running water, especially fast-flowing water, wears away all kinds of rocks and transports the material down the stream, forming alluvial flats and deltas. Fast-flowing rivers, especially in flood time, carry a large amount of matter in suspension, and they use this material to wear away the rocks along their sides and bottoms. The Nile carries in suspension 54,000,000 tons of solid matter per year, and in solution 17,000,000 tons per year. The Mississippi carries in suspension 406,000,000 tons, and in solution 120,000,000 tons per year. All this vast quantity of material has been derived from the weathering of rocks.

Glaciers, only known in very cold countries, are slow-moving streams of ice, Not only do they transport rock fragments on their surface, but, by means of similar fragments frozen in their lower layers, they wear away the solid rocks over which they pass. All this transported material becomes deposited where the glacier ends, and much of it is then carried away by the flowing water derived from the melting ice over large areas. We have evidence of soils formed by such action in Victoria, United States of America, Canada, and Europe.

All the above agents are Nature's chisels and planes, and they are continuously at work, acting slowly but surely. They convert the solid rocks into soil, unlocking from them the essential constituents so necessary for plant growth.

The physical nature and chemical character of a soil depend largely on the nature of the rocks from which it has been derived.

Granite alters considerably when weathered. The quartz grains are unaltered, but the other minerals pass into clay, iron oxides, &c. A residual soil derived from granite contains the quartz grains as sand, with more or less clay, and it is often stained yellowish or reddish by the iron compounds formed. It contains a very valuable plant food (potash) in a soluble form; such a soil is good for fruit-growing. Basalts pass to a clayey soil, without any quartz sand, coloured brownish or reddish owing to the abundance of iron compounds. With much organic matter, such a soil is coloured black. Such soils are usually poor in potash but relatively rich in phosphorus and lime. Trachyte and rhyolite give light-coloured soils, the former often clayey, comparatively poor, unless they are formed from the rarer varieties, such as in the Fassifern district, which contain potash and soda minerals.

Sandstones lose their cementing material and pass into sandy soils; shale into clayey soils, sometimes coloured dark by presence of organic matter.

Limestone rocks, formed from ancient accumulation of marine organisms such as corals and foraminifera, form light-coloured calcareous soils rich in carbonate of lime.

Plants and animals play a great part in the formation of soil—e.g., roots of trees split rocks, old stump holes and rabbit burrows permit freer access of air and rain, earth worms bring up the lower layers of soil on to the surface. Decaying vegetation adds organic matter to the soil and so increases the percentage of carbon dioxide in the soil, air, and water, and thus promotes more rapid decomposition of the minerals in the soil.

Man also changes the physical nature and composition of the soil by tillage, irrigation, drainage, rotation of crops, ploughing in of crops, addition of fertilisers, &c.

The lecture was well illustrated with lantern slides, photographs, and specimens of rocks and soils.

THE PAPAW.

By G. WILLIAMS, Instructor in Fruit Culture.

The Papaw or Papaya (*Carica papaya*), originally reported as being indigenous to Central America and West Indies, is freely distributed throughout coastal Queensland. The small herbaceous tree is practically branchless and surmounted by a crown of large palmate leaves, at the base of which the fruit is produced, this usually maturing after the fall of the foliage from that part of the stem where it is situated. The branchless habit of the tree can be varied by the removal in the early stages of terminal buds, whereby branching is induced and several fruiting heads developed.

The Plant and Its Properties.

The succulent flesh is very agreeable to the taste, though preferred by many with the addition of sugar, lemon, or orange juice, the fruit being cut transversely, the seeds removed, and such additions as preferred applied in its capacious cavity. The fruit is credited with containing properties which materially aid digestion, as also are the seeds, which resemble watercress in flavour. The foliage applied as a wrapper is said to have the effect of rendering meat tender—a feature that exists mainly in imagination. From incisions made with a bone or ivory knife in the unripe fruit, the milky juice exudes freely and is collected, dried, and exported from the West Indies and Ceylon to other countries where is is sometimes used as a substitute for pepsin. The demand is said to be limited and irregular.

Under favourable conditions, the first fruit are matured within twelve months from planting; location and rainfall are responsible for variations. The term of productiveness is short, seldom exceeding four years, but this to some extent is compensated by its unbroken continuity.

Cultivation.

Fertile and well-drained soils are essential to successful cultivation. The most vigorous growth is evidenced and the finest fruit produced on volcanic scrub soils. The quality of the fruit varies under different conditions of soil, location, and humidity. Essentially a purely tropical product, the finest fruit are those matured without an excessive moisture. In some of the Northern scrubs Papaws are widely distributed, but under the influence of shade the trees are spindly and the fruit undersized and lacking in flavour. Fruit produced under semi-tropical conditions is admittedly inferior to the purely tropical product.

Varieties.

Various types or varieties have from time to time been introduced into Queensland, but the typical features have by cross-fertilisation been almost eliminated. Two types introduced to the North worthy of mention are the New Guinea or "Long Tom" and the Cowleyii or "New Era" (said to have originated in the Philippines), both being bisexual. The elongated fruit of the former is not quite equal to the latter, but a heavier weight per tree is returned. Earlier introductions were confined to the original unisexual variety, which from a batch of seedlings frequently developed an excess of male and consequently practically unproductive plants, though occasionally the panicles of male flowers are interspersed with those capable of fruit production; the fruit of such are invariably small and inferior. Various suggestions, more or less absurd, have from time to time been published as infallible tests for determining the sex of the young plant, but experience does not favour the acceptance of any of them. Among a batch of seedling plants a wide variation in vigour will be noted, and a reversion of the usual practice of selecting the strongest plants should be applied, for it is found that the most vigorous plants almost invariably turn out to be males.

Planting.

Seeds are planted in boxes or seed-beds under partial shade in early spring, and the young plants are put out when from 8 to 12 inches high, the foliage, except the young undeveloped crowns, being removed, allowing part of the petiole or leaf stalk to remain. Where plants are grown subject to the influences of shade, this should be removed several days prior to transplanting, also water should be withheld, but applied liberally just prior to removing, so that the roots may be mutilated as little as possible. In addition to fertility and good drainage, a soil containing a liberal proportion of humus favours development. No applications of fertilisers to light soils can maintain equal results. Liability or otherwise to frost should be considered in respect to location, for there are few cultivated plants more susceptible to frost injury than the Papaw. In planting the possibility of numerous male plants is present. The effect to a great extent may be minimised by including in place of one plant two in close proximity, and subsequently removing one when the sex is determinable. If both are males they should be discarded, male trees being entirely superfluous. Six feet apart has been given as a reasonable distance for planting, but to this at least 2 feet can be added, with 9 or 10 feet between rows to allow for reasonable development and room for the necessary cultural operations.

Fertility being absolutely necessary, applications of fertilisers should be made in accordance with directions contained in the pamphlet "Complete Fertilisers for Farm and Orchard," issued by the Department of Agriculture and Stock, and obtainable on application to the Under Secretary, Brisbane.

Diseases and Pests Affecting the Plant.

Under fair conditions the Papaw is reasonably free from disease; fungus in Southern districts is sometimes evident on the fruit by discoloured areas of varying extent, causing decay in their vicinity and occasionally affecting the whole fruit. This is preventable by the application of Bordeaux mixture or Bordeaux powder. In some seasons the larva of a moth is persistent in its attacks upon the stem, which it usually enters close to the leaf bases, and may completely destroy the tree; against this it is questionable whether treatment is warranted. Red Spider amongst the young foliage and nematodes on roots are to a great extent attributable to placing plants in unsuitable soils, particularly those of a light sandy nature, though weather conditions adverse to growth are congenial to both pests. Dusting with fine sulphur will have some influence against the former, but remedial measures cannot be profitably applied against the latter.

Being a comparatively shallow rooter, weed growth should be eliminated from plantations and cultivation confined to a shallow depth, varying slightly according to the nature of the soil, 3 to 4 inches being quite sufficient in that of a close texture.

Marketing.

For marketing, sufficient care must be exercised so that the fruit is not bruised when handling, and packing is preferable in shallow trays or cases, so that there will not be undue pressure of fruit. Just at what stage of development the fruit should be gathered will vary according to distance from market and transport facilities, but the nearer the fruit approaches maturity at the time of taking from the tree the more pronounced will be its flavour, and when the market is readily accessible colouring should be evidenced at its apex.

In addition to its place as a dessert and entering into the composition of various condiments, the flesh of moderately mature fruit may by cutting into strips be satisfactorily dried by exposure. It is unlikely that the dried fruit will find a market where fresh supplies are available. The green fruit is utilised as a vegetable, treated and served in the same manner as a vegetable marrow.

THE FARM TRACTOR.

LUBRICATION--CRANKCASE DILUTION.

With the many improvements which have lately been effected in tractor engines, crankcase dilution is not being experienced in the average late model tractor to the extent it was in previous years. It is, nevertheless, an ever-present cause of worry, and is responsible for a very high percentage of the repair bills which have to be met for worn engines.

In the motor-car engine only a very small percentage of crankcase dilution occurs, on account of the fact that the spirit used for power purposes is highly volatile and vapourises very readily, with the result that very little of it finds its way past the piston rings into the crankcase.

In the tractor where the internal combustion motor is using kerosene as a fuel, however, a certain percentage of crankcase dilution must occur on account of the fact that, when the piston draws in a cylinderful of gas, the gas comes into contact with the cylinder wall, which is comparatively cool, and some of it condenses in small globules of liquid kerosene, which is absorbed by the oil on the cylinder wall, and therefrom works its way into the crankcase.

The tractor driver himself can do much to obviate the causes of trouble. It is a fact that a careless driver will increase the percentage of dilution considerably by—

(1) Switching over to kerosene before the engine is sufficiently warm. The result of this is that the kerosene being drawn in does not vapourise, and consequently does not burn completely.

(2) Running the motor too cold. The most efficient working temperature for a tractor burning kerosene is 200 deg., or almost boiling. Mechanical faults such as poor ignition, incorrect carburetter mixture, worn piston rings, &c., all result in an excess of unburnt kerosene getting into the oil.

Naturally, the percentage of crankcase dilution is also governed to a very marked degree by the quality of the kerosene which is used in the engine. If the fuel is too heavy complete vaporisation does not take place, and these unvaporised fractions get down between piston and cylinder wall and heavily dilute the oil in the crankcase. Kerosene is not a lubricant, and crankcase oil which has a content of kerosene loses the major portion of its lubricating value. It is interesting to note that the new "Cross" kerosene just placed on this market by the Shell Company is remarkable for its property of complete combustion wherein an absolute minimum of crankcase dilution is assured. Only in a kerosene specially prepared to meet all conditions of tractor operation is this very desirable feature to be found.

FOOD FLAVOURS IN CREAM.

By CHAS. McGRATH, Chief Supervisor of Dairying.

TO increase the consumption of dairy products it is necessary that all engaged in the industry shall take such action as will ensure a supply of dairy products of a quality that will attract the favourable attention of consumers. A food product in order to maintain a favoured place in competition must appeal to the taste, and there is no food more subject to off flavours and odours than milk and its products.

Causes of Undesirable Odours.

Undesirable flavours and odours in milk and milk products are attributable to one or more of the following causes:—Abnormal physical condition of the animal, feeding highly flavoured foods, absorption of odours by the milk, and changes due to biological changes in the milk and its products.

The defects due to the two first-mentioned causes are noticeable immediately after milking, and are to a great extent under the control of the dairy farmer.

Odours absorbed by the milk include such as arise from tainted air in the milking shed, separator room, cream room, from coming in contact with gas and oil fumes, and odours arising from other sources of contamination. Biological changes in milk and its products are controlled to a great extent by care in production, handling, prompt cooling, and modern sanitary methods of manufacture.

Pronounced food flavour in dairy products is chiefly attributable to the cows consuming highly flavoured feeds which are mixed with our native pasture, introduced grasses, chiefly on scrub soils, and in fodder crops.

Growing of Fodder Crops Essential.

The growing of fodder crops is essential in the economics of dairy farming and the production of milk and cream free from strong fodder odours and flavours is difficult in many localities under varying seasonal conditions.

The elimination of food odours and flavours has received the close attention of many research workers, who found that for the most part this kind of undesirable odour and flavour comes through the body of the cow, being transmitted through the stomach and lung walls direct to the blood, then through the mammary glands to the milk.

Grading officers are familiar with the strong odours and flavours in milk attributable to the feeding of highly flavoured foods such as green lucerne, silage, turnips, rape, rank pasturage, also the animals eating small quantities of certain weeds and shrubs. It is found that if the milk is drawn from the cow within one to two hours after she has [illegible] some varieties of high-flavoured feeds the milk will carry the strong food flavour, and if drawn subsequent to such period it may be comparatively free from food flavour.

The odour and flavour imparted by some varieties of high-flavoured weeds and fodders will impregnate the milk drawn three to six hours subsequent to being consumed.

Cream, the product of healthy cows grazed on weed-infested pastures or fed strong-flavoured foods produced and handled under approved conditions, will, on account of its strong flavour, be classed below first grade at the factory.

The Possibility of Elimination of Odours.

An important matter for consideration is the processing of cream so as to eliminate the undesirable food flavour and odour.

We realise that the highest quality of butter will be produced from choice cream, and that any improvement in the general quality of cream will come from a keen appreciation on the part of the producer of the importance of care in production and handling, rapid cooling, and frequency of delivery at the factory. The problem of preventing or overcoming the food flavour and odour defect in cream is difficult of solution.

The elimination of undesirable weeds from pastures and cultivated plots on which the dairy cows are grazed is a matter that offers many difficulties owing to the conditions under which the industry is carried on.

Pasteurisation of cream for butter-making has a decided commercial and economic value by improving the flavour and storing qualities of the butter.

One of the many beneficial effects of the process is the elimination of certain strong food flavours, volatile and volatilisable flavours and odours being diminished or eliminated in the process of heating, cooling, and aeration.

The successful heating of the large quantities of cream of varying acidity to pasteurising temperatures is an art and science more complex and more difficult than the pasteurisation of market milk.

Any method of processing to be successful must be carried out without injury to the butter fat, which is very sensitive to other agencies than micro-organisms.

The fat in sweet fresh cream is not injuriously affected by temperatures high enough to sterilise it. The treatment of cream delivered at the butter factories in a sour condition presents an entirely different problem.

The combination of high acid and heat constitutes a powerful corrosive or oxidising agent and, by inviting oxidation of the less stable components of the butter fat, particularly the olein, gives rise to oily and metallic flavours and lowers the storing qualities of the product.

The elimination of food flavours from cream has received the attention of research workers in the dairy industry for some years, and as a result of their investigations a method of deodorisation has been introduced. A deodorising unit combines the processes of pasteurisation and aeration of the cream, and may be used solely as a batch pasteuriser.

Under the process the cream is heated and aerated in a partial vacuum so as to prevent oxidation of the butter fat, which is liable to take place when cream is exposed to high temperatures at atmospheric pressure.

Acid Reduction.

Before submitting the cream to high temperatures excess acid must be removed. The process of acid reduction of the cream must be carefully carried out in order to obtain satisfactory results.

In butter factories with large outputs a deodorising unit would be used in conjunction with a flash pasteuriser, the cream passing from the pasteuriser to the deodoriser.

The deodorising unit is a vacuum pan constructed of glass enamelled steel. The heated cream is passed from the flash pasteuriser into the deodoriser when the gauge shows a reading of 18 to 20 inches of vacuum. As the heated cream passes through a spray device into the vacuum pan it forms into a fine mist, which facilitates the removal of the off flavour and odour. The temperature of the cream delivered into the deodoriser should be approximately 145 deg. Fahr., at which temperature it should be held during the processing.

This treatment, however, is not sufficient to remove strong off flavours and odours, and the cream is treated with large volumes of heated air (temperature, 160 deg. Fahr.) under a vacuum of 7 to 10 inches.

During the processing the cream is circulated from the bottom back over the distributing pan at the top of the deodoriser, the circulating cream being held between 140-145 deg. Fahr.

Samples of cream are taken from the deodoriser at intervals in the processing, and when the removable off flavours and odours have been eliminated the processing is completed.

It is necessary to stress the point that only volatile and volatilisable flavours such as green lucerne, silage, rank pastures, and a variety of feed flavours and minor taints are eliminated by the process. Flavours that are not volatilisable may be somewhat reduced, but are not eliminated by processing. They may be classed as follows:—Metallic, cheesy, bitter, rancid, and fermented cream.

By careful grading of the cream material benefits are obtained by deodorisation, as the treatment is effective in removing volatile and volatilisable flavours and odours.

Experiments carried out over two seasons have given favourable results from deodorisation when the cream was carefully graded.

The improvement in the flavour of the product of the pasteurised and deodorised cream varies from 1 to 1½ points higher than the product of the pasteurised but undeodorised portion of the cream.

BERKSHIRE PIGS.

A BRITISH BREED—ITS ORIGIN.

E. J. SHELTON, H.D.A., Senior Instructor in Pig Raising.

OF the several breeds of pigs suited to the climatic conditions and the environment of Queensland, none appear to be so popular or so widely distributed as the Old English Berkshire, also occasionally referred to now as the Improved Berkshire and more frequently and correctly as the Berkshire. The type was named after the county in England in which it was originally developed and bred, and is considered to be the oldest of the improved British breeds of pigs. By the term "improved" it is intended to indicate that the breed has been built up and improved upon as a result of an admixture of breeds, inbreeding, selection, and gradual grading up from a mixed type to one recognised for more than a century as a pure breed that can be depended upon to reproduce its type faithfully and regularly, under almost any normal farm condition.

Historical Record.

Historical records tracing away back to the year 1820 indicate that among the early fanciers of this class of pigs was one, Lord Barrington, who did much to improve the type, which at that time was of a very much heavier and coarser build than is common nowadays. In colour these older types were variable; some were white, some were quite black, while some were black and white with a patch of white on the shoulder; some were reddish, some rough-coated, others fine, and they were not noted for early maturity or prolificacy as we understand such terms in these days.

Herbert Humphrey was a very successful breeder of Berkshires in 1862, the year when the breed was first given a special class at live stock shows. He was the chief mover in establishing the parent body, the British Berkshire Society; for over twenty years he compiled the Herd Book and edited its proceedings. Since then breed societies, like the show yard, have exercised a stronger influence on type and quality than any other activity.

The British Berkshire Society has now amalgamated with the National Pig Breeders' Association of England (The N.P.B.A.) and pedigrees are included in the Herd Books which that association publish. In Australia the interests of Berkshire breeders are cared for by the Australian Stud Pig Breeders' Society (formerly the Berkshire and Yorkshire Society of Australasia).

The Popularity of the Berkshire.

Berkshires, the world over, appear to have attained a standard of popularity not excelled by any other breed, though breed competition is exceedingly keen and there are many aspirants in the bid for popular favour.

The breed certainly had an advantage in being one of the first of the British breeds to be popularised, its dual purpose nature and adaptability have also been advantages and will continue to stand to the breed against competition from any other medium or large breed of similar type. They appear to be adapted not only to the cooler climatic conditions prevailing in England, Europe, and America, but to the warmer climes of Africa, the islands of the Pacific and to Australia and New Zealand, while they acclimatise readily and become adapted to conditions in almost any part of the world. Coupled with this popular favour the breed possesses a ready aptitude to mature either as porkers or baconers, and can be utilised to advantage as porkers at around 4 to 4½ months of age and as baconers at less than six months of age. It costs a good deal more to feed them after they scale 130 lb. dressed, and the bacon curers class them in a lower grade if too coarse and heavy.

Their Early Development.

It is recognised of course that Chinese, Neapolitan, and perhaps also Siamese pigs were used for mating with the old English wild pig to form a foundation of the new type, while doubtless the prolificacy of the Old Chinese type (this breed was white in colour) has been handed down through the various stages of improvement. The older types of Berkshire, as illustrated in a very old oil painting in possession of the Agricultural Department of the University of Edinburgh, shows the breed as of a chestnut colour with dark patches through the hair; russet coloured spots were also common, and these still appear in Berkshires that show a tendency to degenerate, the reddish tinge in colour coming out very strongly in second and third crosses of improperly marked stock.

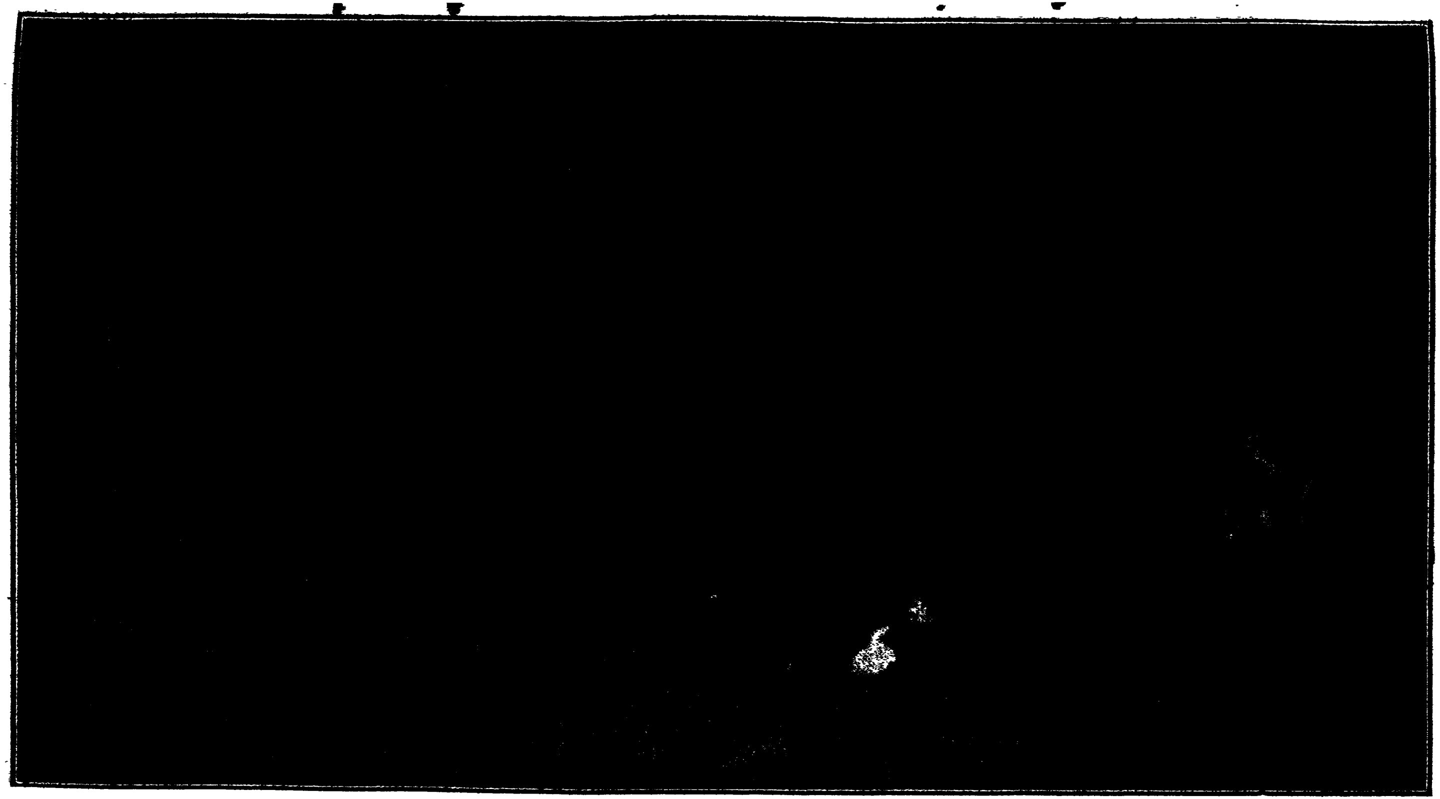

PLATE 118 (Fig. 1).

Berkshire Boar " Leadenham Duke" B. 748. Winner of the "Eaton" Challenge Cup for the best Berkshire pig exhibited at the Royal Agricultural Society's Show, Newport (England), 1927. Bred by Captain J. S. Reeve. Exhibited by Mr. J. D. Player. Note comely, attractive appearance, masculine sturdy type, great length and depth of body, colour markings, strength of legs. A type of Berkshire popular with British and Australian, and with many overseas breeders. Photo. by " Farmer and Stockbreeder," published in Vol. 44, National Pig Breeders' Association Herd Book.

In America they still have a "red" Berkshire, a type evidently evolved from this Old English russet-coloured strain, with, possibly, additional Tamworth crosses. The journal called the "Complete Grazier," in an issue in 1845, describes the breed after it had been materially improved from the standard of earlier days, as in colour, reddish-brown, with brown or black spots, sides very broad, legs flat, ears large and pendulous over the eyes, body thick, close and well made.

The Modern Type.

In a report published a year or two ago by the British Berkshire Society it was stated the chief characteristics of the modern Berkshire are their hardiness, active disposition, general conformation, and their evenly developed carcase; the article adds that the breed is unsurpassed as grazers and foragers. As a result of their strong digestive and assimilative powers their increase in weight is large in proportion to the amount of food consumed.

The average quality of Berkshire pork and bacon is such that if properly fed and handled from birth the carcase can be graded as extra prime. The fat and lean should be evenly intermixed and of excellent texture, while the pigs should dress out well in proportion to their live weight. The roomy lengthy framed Berkshire with a medium type head and a fine coat of hair is much sought after; these are noted for early maturity, quick growth and for prolificacy, three very desirable characteristics in any breed of pig.

Show Yard Influences.

There can be no denying the fact that the Berkshire has undergone more changes in type under the influence of the show yard in recent years than any other breed of pig which has been recognised in prize schedules for an equal length of time. There never was a time when quality and correct type were more keenly sought after and obtained by the breeder than now, for there is no call at all nowadays for the longer nosed, rough coated, coarse type of years ago.

Be it understood, too, it is no easy job breeding the correct type, nor is it an easy matter securing well marked pigs, as markings are. In fact it is doubtful if there is any other type in which it is so difficult to secure the ideal set out in the Herd Book standards as in the Berkshire; hence really well marked, typical animals, guaranteed breeders, and of an early maturing, prepotent type are always worth breeding. Fortunate is the breeder who has such types and who can perpetuate all these good qualities in his herd of pigs.

Colour Markings.

From the layman's point of view, it is a debateable point whether it really pays to stick to the Herd Book standards of colour markings seeing they are so difficult to reproduce, and that they are of no value whatever from a pork butchers' or bacon curers' point of view. Breeders of other types of live stock have had to face the same difficulties, and in many instances have had to give way and resort to broken coloured animals in order to retain other valuable characteristics, like conformation, prolificacy, and early maturity. Breeders of Clydesdale horses, for instance, have had to depend on many occasions on sires that carried broken (or even to the layman indifferent) markings; breeders of Jersey cattle years ago would not have dreamed of using the broken coloured animals one notices nowadays in the show ring, yet it would not be correct to say that broken coloured animals are any the less valuable in the herd than the whole coloured stock so popular in days gone by. Berkshire breeders and those responsible for the preparation of the Herd Book standard have, however, not thus far given away on this important point, hence colour markings are still required to be as per the standard published in the concluding paragraph of this article.

These matters are well worth discussion at meetings of breeders interested in the stud pig business, for they are important, and may or may not have far-reaching effects on the future breeding of this class of pig. Suffice it to say, the animal must have a colour acceptable to the breeders of the type, and at present broken coloured pigs, those with patches of white in the ear, with one or more black feet, with a black tail or with white on any other portion of the body than those allowed for, will not realise top values except they are otherwise of exceptional merit, and really worth the money. Nor is it likely the broken coloured sorts will win in competition with better marked animals at any of the more important shows where Herd Book standards are accepted. The call is for well marked and well developed sorts, and without these qualifications stud values cannot be expected.

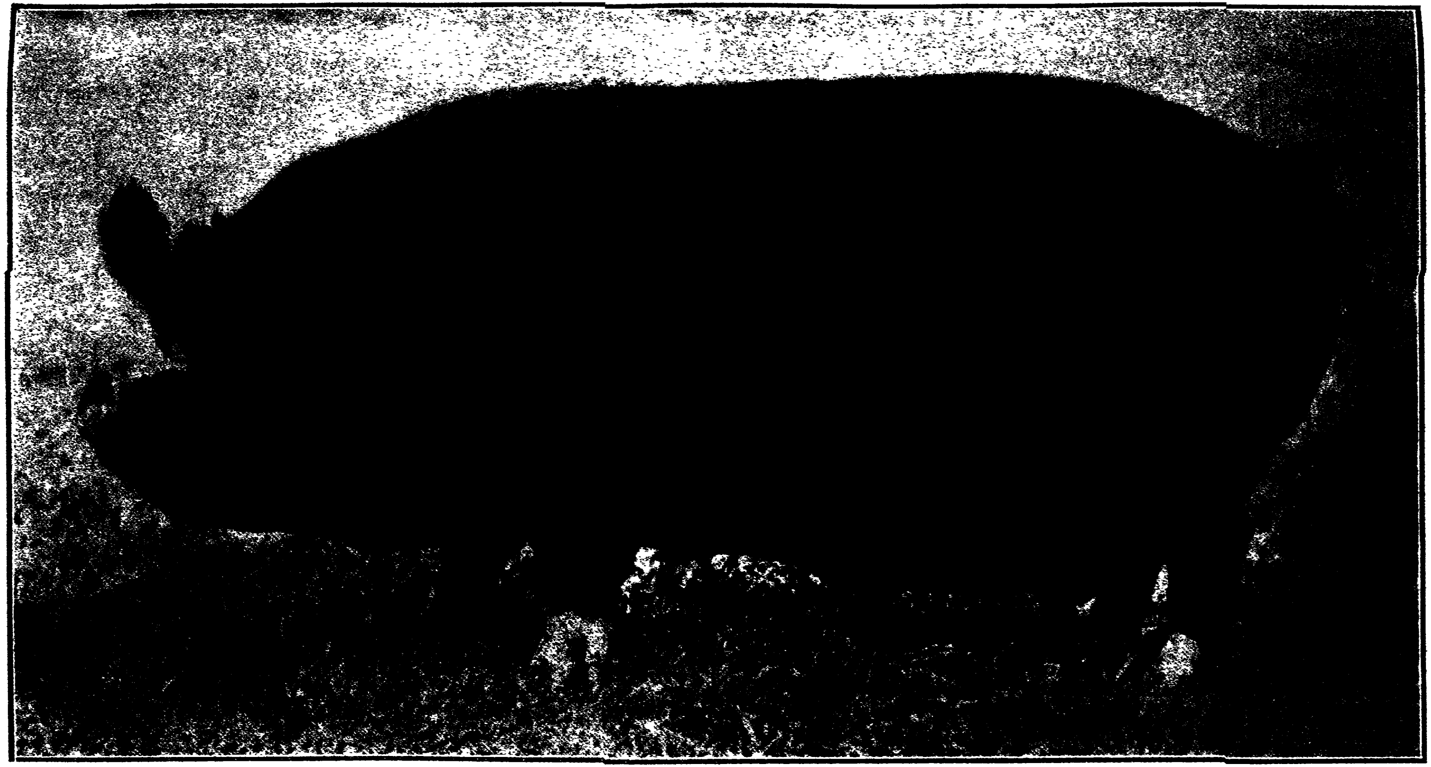

PLATE 119 (Fig. 2).

Berkshire Sow, "Whitley Ella's Beauty" S.5593. Winner of the "*Eaton*" *Challenge Cup for the best Berkshire pig exhibited at the* Royal Agricultural Society's Show, Nottingham, England, 1928. Bred and exhibited by Reading Corporation. Note difference in type and appearance to the Canadian Berkshire in Fig. 3, this indicating the wide range in type preferred by breeders in different parts of the world. The Canadian type has not yet been introduced into Queensland, where British types are predominant. Photo., "Farmer and Stockbreeder," published in Vol. 45, National Pig Breeders' Association Herd Book.

Breed Characteristics.

Prominent amongst characteristics claimed for the Berkshire breed by breeders of this type might be mentioned—

(1) Great muscular power and vitality which renders them less liable to disease. The boars are prepotent to a degree; the sows are fairly prolific.

(2) Activity combined with strong digestive and assimilative powers; hence Berkshires return a maximum of flesh and fat from the food they consume. They are good doers but need very careful handling, otherwise they become over-fat, and this in turn may lead to sterility and barrenness, and to unsatisfactory growth.

(3) The sows are reasonably good nurses and good sucklers if in medium breeding condition. They possess good limbs and good quality flat bone. Care should, however, be taken to avoid weak-legged pigs when selecting, for some strains have inbent knees and "cow" hocks and are down on the pasterns.

(4) The young pigs are strong, smart, and active at birth, consequently are well able to look after themselves if carefully handled.

(5) Berkshire can be fattened for market at any time, whilst they can be fed to any reasonable weight required.

(6) The flesh provides a high quality pork and bacon much sought after by pork butchers and bacon curers. Australian experience proves that the Berkshire for this purpose is ideal when crossed for pork with the Middle Yorkshire or a similar type and with the Tamworth or other large breeds for bacon. Some breeders also favour the use of Berkshire boars with first cross Tamworth-Berkshire sows, these latter sows having proved their adaptability and usefulness for farm purposes here. There are many instances where these grade pigs would be even a better proposition than the purebred Berkshires for pork and bacon production.

(7) The Berkshire boar possesses remarkable powers in transmitting the valuable qualities of the breed to his progeny, both in the purebred form and when used as a cross. This power is referred to as "prepotency," and is a very desirable quality. No breed has been used more extensively for cross breeding purposes than the Berkshire, nor has any been found to be more useful in refining the progeny of coarser types.

(8) Berkshires possess unsurpassed uniformity in quality and type; they reproduce themselves faithfully; their reasonable size, quick growth and easy feeding powers with uniformity and hardiness make them a favourite with breeders of pigs generally. Special care is necessary in the selection of breeding stock to ensure securing animals from well marked reliable strains; these are worth more money than those strains not noted for trueness to colour markings, &c.

(9) When slaughtered Berkshire flesh has a fine texture with a good proportion of fat and lean. The meat is sweet and of good flavour, this the result of quick growth and early maturity. Avoid overfat meat or stock.

(10) Both boars and sows have an excellent disposition; they are quiet, docile, and contented, and it is uncommon to find a bad-tempered fence-breaker amongst them; if one is found there should be no delay in immediately culling him or her from the herd. Cull out all unsatisfactory sorts without reference at all to breeding or purchase price. It does not pay to keep or feed inferior stock.

(11) Under normal farm conditions Berkshires are reasonably prolific and this characteristic can be distinctly improved by careful selection and breeding. In and in breeding, breeding too closely, and neglect soon tell their tale in reduced and irregular breeding powers; this also lowers the standard of quality and causes animals to be classed as "slow growers."

(12) Both fine and thick-haired types do well. The former or a medium type is the more popular; the thick, coarse haired types of years ago are not common or desirable now, for they are not as attractive or symmetrical as the medium coated (often referred to as the improved) types.

Berkshires are medium in size, trim in appearance and free from roughness—coarse wrinkly types should be ruthlessly discarded as breeders. They are well modelled and possess—in specially selected strains—the very necessary length and depth of body and hams. Short dumpy types are undesirable. The face is short and dished; the ears erect and slightly pointed; the hair glossy, soft and fine. Swirls, roses, and cowlicks in the hair along the back or rump are distinctly objectionable as these are regarded as definite faults in the show yards. To the pig fancier the well-bred Berkshire has a captivating and symmetrical outline.

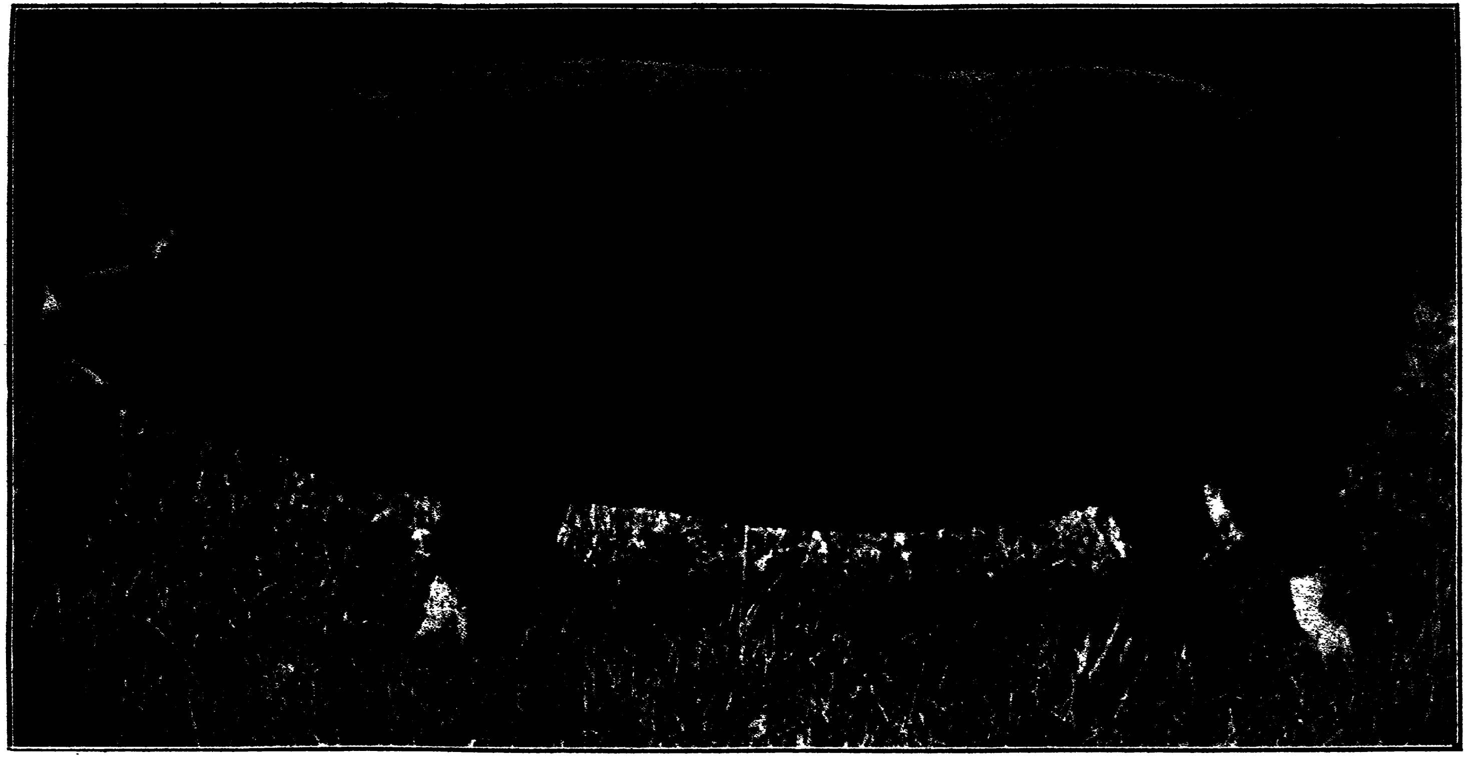

PLATE 120 (Fig. 3).

Berkshire Sow, "Woodburn Laurel," imported from Canada. Royal Champion Berkshire Sow, Palmerston North, New Zealand, 1928, owned by Mr. J. A. Russell, Gillespie's Line, Palmerston North. New Zealand. A type of sow popular with Canadian and Dominion breeders on account of great length and depth of body, well developed hams, and fine quality of skin and hair. Note striking contrast to British types. Photo. courtesy New Zealand Pig Breeders' Association, Inc. Published also in the New Zealand Herd Book, Vol. 40, 1928.

Some Objectionable Features.

As with all other breeds some strains of Berkshires and some individual animals have undesirable features. A few of these noted over a long experience in the judging of pigs are as follows:—

Legs and Feet.—Weak, inbent forelegs, flat feet, weak pasterns and cow hocks. A pig with weak legs and feet is a very poor proposition and should be culled and sent to the butcher as soon as it is possible to put the animal in marketable condition.

Head.—Crooked jaws, tongue protruding from side of mouth, undershot or overshot top or bottom jaw, snout too long and crooked, ears lopped and too large. Eyes weak and with heavy overgrowing eyelids eventually causing blindness.

Body.—Heavy wrinkles behind the shoulder and along the side; weak loin and tucked-up flanks. Sows showing very poor development of and insufficient number of teats (less than twelve, evenly placed, prominent teats). The number considered most desirable is twelve to fourteen. Boars showing signs of rupture (hernia) in region of navel or in scrotal sac. Goose rump, drooping away towards low-set tail and weak tucked-up hams.

These, together with the tendency to carry too much condition and become lethargic or dopey, are all serious faults in any breed and should be avoided at all costs. No breed or no animal is perfect, and an inferior, badly marked Berkshire is no better than an inferior animal of other breeds. It pays to keep the best.

Breed Societies.

Following on after the formation of the British Berkshire Society in 1845, the American Berkshire Association was organised in 1875 and the National Berkshire Record in 1893. It was during the year 1900 that the Berkshire and Yorkshire Society of Australasia was organised, and this society grew to such dimensions that in later years it became necessary to reorganise the parent body. This has now been completed, and the new organisation, styled "The Australian Stud Pig Breeders' Society," has headquarters in Melbourne, Victoria, and branches in the various States. The Queensland Branch Secretary is Miss J. Mackay, of Inns of Court, Adelaide street, Brisbane, from whom can be obtained a beautifully illustrated brochure entitled "Better Pigs on Every Farm," in which the organisation and development of the society is referred to.

These societies have done much for the Berkshire and for the other breeds registered in their herd books. Our own Society has been the means of organising the distribution of the various breeds to the four corners of the Commonwealth. To-day in Australia Berkshires stand at the head of the list as being the most readily adapted to any climate, soil or condition; they will reproduce with equal facility and quality both for pork and bacon.

The Berkshire as a Breeder.

The Berkshire sow makes an excellent, contented mother—sturdy, vigorous, and thrifty, cleanly in habit (if given a chance to be so), fairly prolific, averaging from eight to ten per litter. The suckers when born are sturdy, lively, keen, and develop rapidly.

Sows should not be retained as breeders when over seven or eight years of age, as they lose their teeth and often become very clumsy and poor sucklers. They can, of course, be fattened and marketed as back-fatters if food is reasonably cheap and plentiful.

If the stock are too finely bred, however, they deteriorate and produce puny litters. The breed exercises a powerful influence in the production of good type pigs in country districts. Cross-breeding can thus, by the maintenance of pure, strong, prepotent types, be made of considerable local value.

Berkshire Boars.

Some very high prices have been secured for Berkshire boars abroad. We have record of a genuine Canadian sale of the Berkshire boar, "Premier Longfellow," who was champion at the St. Louis State Fair in 1916, and at the sales realised £400. The record price in England is £500, whilst Berkshire sows have topped the sales on many occasions. Stud pigs have never realised these prices in Australia, but

Plate 121 (Fig. 4).

Champion Prize Winning Berkshire Sow, "Dundas Dora" 6628. Owned and exhibited by M. Porter and Sons, "Roselock," Wondai, Qld. The winner of many championships, and with litter, the winners of numerous prizes at Queensland shows in 1929. This type of sow, popular with Australian breeders, indicates the capacity of the Berkshire to reproduce itself faithfully, and to breed consistently. This sow's progeny have realised hundreds of pounds sterling, and though five years old she is still producing and rearing excellent litters.

from fifty to seventy-five guineas has been paid on several occasions in New South Wales and Victoria for selected animals.

A few years ago it was considered that the Berkshire was much superior to any other breed in prolificacy, but many breeders, taking advantage of the opportunities at auction sales of stud pigs in show rings, have followed a system of excessively fattening their animals. This has, in some instances, resulted in a loss of refinement and quality in the young stock, and a still more serious defect in the loss of hereditary prepotency.

It has been truly said that the "pig is what the breeder and feeder make it." The show yard winner of to-day is, unfortunately, often a short, chubby, unprofitable animal with an unnatural obesity, thick heavy forequarters, and poor breeding powers.

Berkshires for Pork and Bacon.

In an interesting and informative pamphlet entitled "Berkshires for Pork and Bacon" issued a year or two ago under the auspices of the British Berkshire Society, the following records of the Berkshire breed appear. We make these excerpts for the benefit of breeders generally:—

(1) THE RECORD OF THE BERKSHIRE BREED.

After being cultivated with increasing carefulness by individual breeders for more than one hundred years, Berkshires were the earliest registered of any breed of pigs in England, and they have been consistently developed with strict reference to commercial requirements ever since. To this is due the wonderful record of the Berkshire breed—a record unrivalled in the history of British Live Stock.

(2) THE PERCENTAGE OF LIVE WEIGHT TO DEAD WEIGHT OF THE BERKSHIRE BREED.

The following table, compiled at the Cambridge University for the "Journal of Agricultural Science," giving the comparative percentage of meat for pigs of different ages exhibited and slaughtered at Smithfield, shows the marked superiority of Berkshires over other breeds for both pork and bacon:—

	Three Months.	Five Months.	Seven Months.
Berkshires	77.0	78.7	81.1
Middle Whites	73.0	76.8	82.4
Large Whites	73.0	76.9	80.9
Large Blacks	72.9	73.9	79.7

It is to its superior fleshing capacity, combined with a higher proportion of lean to fat at the early age requisite for tender meat, that the pre-eminence of the Berkshire breed in the carcase classes is due, not only at Smithfield, but wherever they are shown in competition with other breeds.

(3) THE BERKSHIRE PIG ABROAD.

In the Argentine, Australia, and New Zealand—countries in which the commercial aspects of live stock breeding are alone of importance and where the most up-to-date methods are exclusively employed—Berkshires constitute two-thirds of the purebred pig population, which is a striking tribute to the suitability of the breed for all climates and conditions.

This fact assumes particular significance in the case of Australia and New Zealand, where bacon production is a large and growing industry.

In South Africa and Canada, they are second in order of popularity, and they thrive in increasing numbers in Japan, India, the Malay States, and Central Europe.

In the United States of America, Berkshires have long had their own breed society. At the International Live Stock Show at Chicago, held annually, Berkshires have sired thirty champions, and have won first prize in one or more classes nineteen out of twenty-one years—a record unequalled by any other breed.

Since the war the demand for Berkshires for export to all parts of the world has steadily increased.

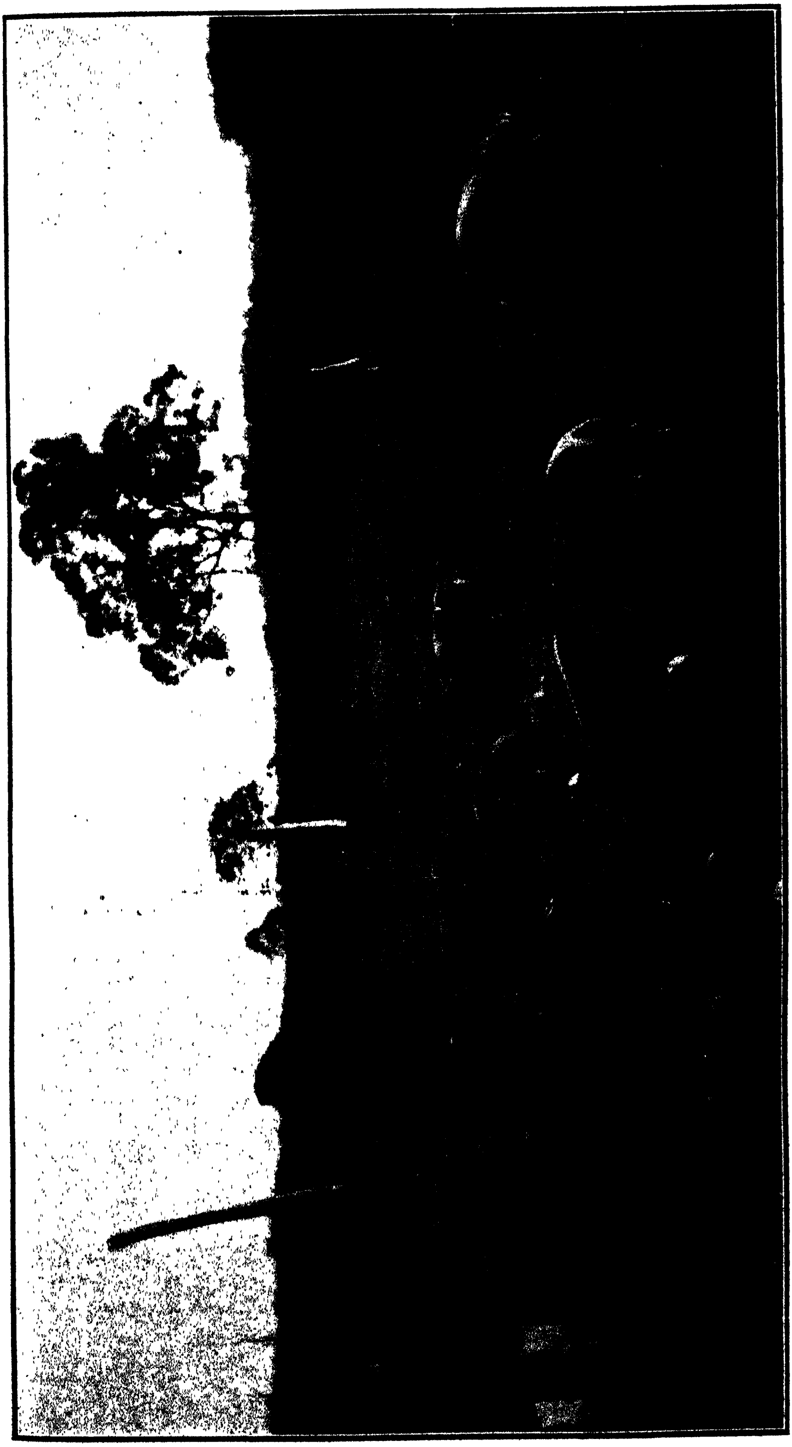

PLATE 122 (Fig. 5).

A group of Berkshires at the "Bon Vale" Stud, property of J. W. Handley, Murphy's Creek, Qld. Productive, prolific, and profitable.

(4) THE SUPERIORITY OF THE BERKSHIRE CROSS FOR BACON.

All independent experimental research for ascertaining the best cross for bacon shows that one or other parent—preferably the dam—should always be a Berkshire.

For Wiltshire bacon, which commands the highest price in the world, the Western Curers' Association in their leaflet, ''Pigs for Bacon,'' say, ''To produce at the greatest profit the best pigs for prime quality lean bacon the farmer is recommended to breed pigs from large white boars and pure Berkshire sows.''

The experiments of the Canadian Government at Scott, Saskatchewan, which have been conducted under the supervision of a committee of curers, have reached the same conclusion—viz., that the large white boar on the Berkshire sow is a better cross for bacon than any other breed or cross.

The Conformation of the Berkshire—"Standard of Excellence."

How closely the type to which the Berkshire has been bred corresponds with the requirements of the bacon curer may be seen by setting out in parallel columns the standard of excellence of the British Berkshire Society and the specification of the curers at a recent conference (in England), at the Ministry of Agriculture, called for the purpose of ascertaining their requirements.

The Curer's Specification.	The Berkshire Standard of Excellence.
Back—Long and level, with ribs well sprung.	Long and level, with ribs well sprung.
Sides—Level and moderately deep.	Level and deep; free from wrinkles.
Hams—Broad, wide and deep to hock; tail set high.	Broad, wide and deep to hock; tail set high and fairly large.
Belly and Flank—Thick with straight underline.	Thick with straight underline.
Shoulders—Light, and on a line with forelegs below, and with sides laterally, free from wrinkles.	Light and aligned with forelegs below and with sides laterally, well sloped backwards, free from wrinkles and coarseness.
Flank—Aligned with sides.	Aligned with sides; should handle firm.
Head, Neck, and Jowl—Light.	Moderately short, face dished, snout broad, wide between the eyes and ears; ears fairly large, carried erect or slightly inclined forward and fringed with fine hair; jowl light; neck light, and evenly set on shoulders.
Legs—Short, and set wide apart; the pig should stand well up on the tips of the toes.	Short, straight, and strong, set wide apart, and hoofs nearly erect.
Bone—Fine.	Fine.
Flesh—Firm without excessive fat.	Firm, without excessive fat.
Skin—Free from coarseness and winkles.	Fine and free from wrinkles.
Hair—Fine.	Long, fine, and plentiful.

Some Interesting Litter Records.

The statement that ''Berkshires do not farrow enough pigs,'' a statement that has often been made in Queensland and in the other States and abroad, has recently been challenged by the Berkshire breeders of America through their secretary, E. M. Christen, an authority on the breed, and an official who has done a great deal of research work over a long series of years.

When asked why this statement had been made, on the occasion of a chat to a prominent Berkshire breeder recently, the answer was short and not altogether satisfactory, for, said the breeder referred to, ''I don't know, but that is what people tell me.''

Observation had, however, taught Secretary Christen that these remarks were not true, because he had seen as many "producing" Berkshires as any other breed in the course of a five years' special study of the type. The ability of the Berkshire sow to produce a sufficient number of pigs was unquestioned in his mind. "Now," said he, "what was the evidence which could be presented to even a biased mind which would convince him that average Berkshire sows not only farrow as many pigs as any other breed, but they also rear as many."

So attention has been turned to the statistics as contained in the first 1,400 litters in volume 63 of the "American Berkshire Record." This survey brought the data strictly up to date, as the 1,400th litter was entered on the 2nd July, 1924. The record of 1,400 litters does not include duplicates such as litter mates. The 1,400 litters showed a total of 12,309 pigs farrowed, or an average of 8.792 pigs to the litter. This is as good or better than the other breeds do, and considerably better than averages on farms where purebreds only are used.

Of the 12,309 pigs farrowed in these 1,400 litters, 9,803 of them were reared. This makes an average of 7.002 pigs reared per litter, which is well within the probabilities of a net return from the brood sow even now.

When one considers that these litters were farrowed, and the records came from every State in the Union, from every age of sow, farrowed in every season of the year, and under every condition, we can accept them as authentic, and without hesitation. One of the tasks of Berkshire breeders is to see that this information passes into the hands of the men who do not know about the breed.

A Berkshire sow, or any sow to be profitable, must farrow a reasonable sized litter, and then rear them. It is true that many pigs are lost before weaning time because of carelessness of the owner, improper management, or wrong feeding. The sow is nearly always charged with the loss, whether it is her fault or not, especially by the sceptic who does not know, nor desires to find, the truth. Breeders must present facts to counteract this.

At the same time we must not bind ourselves to the fact that certain sows or certain families do not produce as large litters as others. When such an animal is found, the sow should be sold for pork. It is reasonable to expect the pigs in a small litter to be plumper and more attractive looking than those in litters of seven, eight, or ten. They ought to be, but there is no reason why they should be retained on the farm. The breeder must ask himself, and answer the question: "If the sow or boar in the big litter had had the same chance, would she or he be as good as the pig before us from a small litter."

This has not been done in the past, and our selection of breeders has been largely a selection without respect to breeding, ancestry, or the chance the pig has actually had. Many simply select the best looking pigs. This is shown by the fact that practically every pig in litters of three, four, or five, were all reared and (in the case of the American Herd Book referred to) were all registered, while it was seldom that more than four pigs were ever registered from a large litter.

It was also noticed that the litters in some herds ran uniformly large in size, while in others they were uniformly small. This goes to show that selection or care, or both, affect the number of pigs farrowed and reared.

A summary of the 1,400 litters mentioned above shows—

9	litters of	3	pigs each	130	litters of	11	pigs each
19	„	4	„	61	„	12	„
46	„	5	„	42	„	13	„
99	„	6	„	12	„	14	„
177	„	7	„	11	„	15	„
282	„	8	„	2	„	16	„
294	„	9	„	1	„	17	„
215	„	10	„				

Total 1,400 with a total of 12,309 pigs farrowed and an average of 8.792 pigs to the litter.

In conclusion, we can say, and should say, that Berkshires are prolific, and use the above-quoted authentic figures to show it. Also, that these Berkshire sows are good mothers, as they reared over seven pigs to the litter, or, to be exact, 9,803 pigs to the 1,400 litters. These figures come without any omission, with no effort to find a favourable record, but as a clear, short presentation as to what an average Berkshire sow will do and can be expected to do.

The Federal Council of the Australian Stud Pig Breeders' Society has adopted the following "Standard of Excellence" for Berkshires, with points allotted:—

	Points.
Head and ears.—Moderately short; face dished; snout broad and wide between the eyes; ears fairly large, carried erect or slightly inclined forward, and fringed with fine hair	15
Neck and shoulders.—Medium length, evenly set on shoulders; jowl full but not heavy; shoulders fine, sloping backward, and free from coarseness	10
Back and sides.—Back long and straight; loin full; ribs well sprung; sides deep and full to flank, showing straight underline; and in sows twelve good, evenly placed teats	20
Hams.—Wide and deep to hocks; tail set high on back line, and fairly large	20
Legs and feet.—Legs short, straight, and strong; feet set wide in line with shoulders; hoofs nearly erect	15
Colour, skin, and hair.—Black, with white on face, feet, and tip of tail; skin fine and free from wrinkles; hair long, fine and plentiful ..	10
Character.—A combination of all points showing distinctive breeding, type, and quality	10
Total	100

PIG HYGIENE.

By H. G. CHEESEMAN, Senior Slaughtering Inspector.

From a paper read before the Pig Raisers' School at the Queensland Agricultural College, Gatton, June, 1929.

Close association with meat inspection and piggeries for the past thirty years enables me to speak with some knowledge of the life and habit of the short-lived pig from its birth to its appearance on the table in various food forms. As we have all been taught, the pig belongs to the order mammalia, species pachydermata, or, otherwise, thick-skinned animal. Briefly, the generic characters of the domesticated animal are small head, ears short, thin, and sharp, neck full and broad, cheek full, flexible and short snout flattened in front, small and quick eyes, mouth small, strongly built body, uniform in line carrying a wealth of condition, short twisted tail well set, four toed, short legged, and full ham.

The wild pig has different characteristics, namely, long legs, long neck and snout, long narrow roach back, thin hams, carcass generally spare of flesh, eats ravenously, and develops big belly and lives on carrion offal.

According to design and nature the dentition of the pig varies considerably; at nine months he shows 40 teeth, and at eighteen months a full mouth of 44. In order, the teeth are divided into incisors or nippers, canine or eye-teeth, molars or grinders. Therefore, from the number and position of the teeth, physiologists are enabled to define their nature and functions, as they are always intimately related to the food and habit of the animal. They form, for the same reason, important guides to the naturalist in classification of animals. Thus the domestic pig can be classed as much a grinder as a biter, for he can as well live on vegetable as animal food, although a mixture of both is economically sound, which has been decided as the most natural.

From this description the pig may be regarded as a link between the herbivorous and carnivorous tribe, and is consequently known as an omnivorous quadruped; or, in other words, an animal capable of converting any kind of foodstuff into nutriment.

Characteristics of the Pig.

Physiologists and naturalists are all agreed that the functional characteristics of the pig are the same in whatever part of the world he may be found—he is known for his gluttony and indifference to the character and quality of his food. Occasionally he shows an epicure's relish for a succulent root, pumpkin, or other vegetable. He will the next moment turn with equal gusto to some unsavoury offal, sour swill, or even liquid and stagnant filth from wallow holes in and about his lair, or, in other words, will endeavour to convert any kind of aliment, good or bad, into supposed nutriment. Hence, from its coarse and repulsive mode of feeding, slothful habits, laziness, and indulgence in sleep, he has gained for himself the unenviable name of being an unclean animal. The question arises "Why?" Well, the answer is simply because the unfortunate animal is the victim of circumstances, brought about by the indifference of his keeper. Consequently, it is only reasonable to suppose that under such influence he is particularly susceptible to disease, saying nothing of other ailments of a dietetic nature, and which set up derangement of the alimentary canal.

Now, as filth defiles physically the characteristics of the flesh, or meat, it behoves those whose livelihood it is to depend upon pig-raising to consider the seriousness of violating the law of Nature, for it rests with man to counteract the evil consequences of some of his habits which the animal is unable to teach himself.

It is a remarkable fact that, though everyone who keeps a pig knows how prone he is to disease or other ailment which injures the quality and wholesomeness of the meat or flesh, yet very few have judgment to act on what they see and provide against it by strict attention to his diet, housing, and general welfare.

By strict attention to diet particularly is meant the thorough cooking or sterilising of all flesh food such as offals from slaughter-houses, skimmed and separated milk from dairies, butter and cheese factories, scraps of cooked animal substances, and boiled vegetables, bread and other aliment cast from banquets and possibly plates of sick and ailing individuals. The lastmentioned is most necessary, and the old adage "Prevention is better than cure" always stands good, for it is known, for instance, that the pig is most susceptible to tuberculosis. We also know that there are many individuals in our midst suffering from that dread disease, and experimentalists have shown the possibility of infection from human beings. In nearly every case the pig is infected by ingestion, thus it will be seen how easily he might become infected if care is not exercised in the systematic selection and proper boiling of all foodstuff.

Tuberculosis in Pigs.

It is quite common knowledge that tuberculosis in the pig develops rapidly without showing any external symptoms. The disease can only be definitely detected upon slaughter. Anyway the disease is always the same from whatever cause. Though subject to disease, no domestic animal is more easily kept in health, cleanliness, and comfort. By comfort is meant that his sleeping quarters should be perfectly dry and well sheltered from all changes of the weather. He should have a nice cosy bed to burrow in; moreover, under cover in his sty, there should always be a trough full of clean drinking water. The trough should be so arranged as to prevent the animal from immersing his body or standing in it, or otherwise fouling it. Clean water is most essential to a pig, saying nothing of a shovelful or two of charcoal, some lime, brimstone, Epsom salts, or other medicinal agent, which are necessary to correct physical disorders caused by his artificial existence.

The Pig's Economic Value.

As you all must know, habit blunts the sensibilities of most of us; and men are not naturally cruel. Still, I am a believer that there are some among us who never realise the fact that the brute beast can be made to suffer quite unnecessarily. What would happen if a pig had a voice to tell its sufferings and needs? I am afraid that many of us could not listen without feeling a twinge of conscience.

There is no domestic animal so profitable or so useful to mankind as the pig. Its value per pound exceeds that of all other flesh-giving animals.

Meat Inspection.

Meat inspection is of great national importance to a meat-eating community such as we are in Australia, especially as our daily bill-of-fare is made up largely from the flesh of the ox, sheep, or pig. Therefore, it is only reasonable to expect that the great mass of consumers—the general public, for they are the most interested in the matter—should have some sort of guarantee that the flesh they do eat is perfectly free from disease.

Meat-eating people throughout the whole world recognise the necessity and importance of inspection of their meat and other food products.

Diseases of the Pig.

Tuberculosis is commonly spoken of as "T.B.," technically it means "Tubercle Bacilli." We are told that tuberculosis is a specific bacterial disease, and above all the most widely distributed of all contagious diseases, saying nothing of its being the most universally dangerous and deadly to man and animal. Of the latter, swine, according to statistics, are first among its victims.

Speaking generally, I have endeavoured to show how easily a pig might become tuberculous when fed on material rich in tubercle bacilli. Apart from such mechanism of infection, a tuberculous sow may infect all its young when its teats are contaminated or otherwise infiltrated by tuberculous deposits. We are also told that infection by the respiratory tract is certainly possible, but rare owing to the fact that affected animals are usually slaughtered before the softening of the pulmonary lesions have time to disseminate the virulent matter.

The disease can only be definitely detected upon slaughter; that being so, the inspector has no difficulty in locating the presence of the disease, that is, as far as the naked eye is concerned.

More often the glands of the head are affected than the body, which accounts for the greater number condemned. Times out of number the question is raised, "Why condemn the head and not the body?" It may be explained this way. The pig mainly breathes through his mouth where straying germs of disease gain an entrance which are absorbed by the delicate membranes of the mouth, tongue, and tonsils, resulting in the fact that the glands draining the part act as fortresses against further invasion of the body. It then only remains a matter of time when they may be overcome by the enemy, thus the barrier being broken down the germ has a clear passage along the ducts into the next lymphatic vessels. It therefore will be understood that if only a speck of disease is found elsewhere in the carcass, it involves seizure of the whole body.

Often a recommendation of the Royal Commission on Tuberculosis in 1898 is cited, which reads: "In view of the greater tendency to generalisation of tuberculosis in the pig, we consider that the presence of tubercular deposits in any degree should involve seizure of the whole carcass and of organs."

This rule, of course, is not carried out in the case where the head is only affected.

Another feature of the disease, from an inspection point of view, lies in the fact that it is seldom met with in the flesh or bones of the pig, mainly confining itself to the lymphatics and delicate linings of the chest and abdominal cavity and organs. The glands, or kernels as they are commonly called, play an important part in meat inspection. It is from them the inspector gets the first indication of the presence of disease. The normal condition and colour of a gland is moderately small, somewhat firm, and on cutting exudes moisture (lymph) the colour of—in fact it resembles—common yellow soap.

The most accessible glands are the sub-maxillary and cervicals of the head and neck, dorsal (back), renal (loin), inguinal or mammeny, and the iliac. Of the visceral glandular organs, lungs, liver, and mesentery, &c., are all more or less subject to disease.

With regard to condemnation for parasitical infestations, very rarely is a pig totally condemned. The only parasite of any consequence is the kidney worm known as the "Stephanurus dentatus." Very little is known about it other than it is very destructive and will sooner or later cause economic losses if the pig farmer does not attend strictly to the laws of sanitation.

The worm itself varies in size, being a thick, round, and mottled specimen and is found abundantly in the kidney region and in other portions of the body. The presence of the worm gives rise to cysts and abscess formation containing pus-producing organisms and eggs of the parasite. They are also found in the ureter; from whence they pass out with the urine. Old sows and boars are very subject to the parasite, and no doubt are the cause of all the trouble in younger pigs. Pigs during life show no evidence of the infestation, unless they are old sows. From my experience the complaint is more pronounced in cold weather than hot.

The conditions which are most favourable for the infestation of the kidney worm are filthy wallows, insanitary feeding and watering places, especially where large numbers of pigs are kept year after year on a small area. Veterinarians tell us there is no reliable method of dealing with the trouble other than thorough sanitation. That being so, the pig farmer must then seriously consider the matter of changing his sties and yards every year or so to fresh ground, and planting a crop before using the piggery again for pigs. In any case, pig yards should be selected with a view to securing proper drainage, cleanliness, and sanitation. They must also be as free as possible from the common type of mud wallow, which soon becomes a reservoir of concentrated filth and bacteria.

In conclusion, I would plead for the pig's welfare and comfort, and again stress the fact that much disease and other disorders are due to insanitary feeding and unclean drinking troughs in which the pigs are able to place their feet which carry filth direct from the floor of the sty

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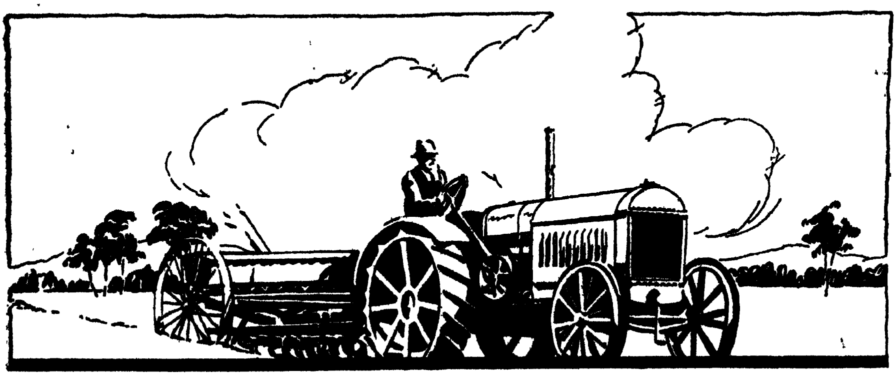

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REGD

REARING AND FEEDING OF CHICKENS.

P. RUMBALL, Poultry Expert.

POSSIBLY the most important feature in poultry-keeping is the successful rearing of the young stock. To be profitable in after life, stock have to be well grown and correctly fed from infancy. Many conditions are necessary to obtain this class of stock, but given good sound breeding stock and good incubation, the rearing and feeding are the next essential points.

Rearing.

If the chickens are hen-hatched, very little attention other than keeping them free from vermin, protecting them from predatory animals, and correct feeding are necessary, but when hatched by incubators artificial means of brooding have to be resorted to.

Artificial brooding of chickens is a difficult process with an inefficient plant. The aim is to supply heat or to keep chickens warm, and at the same time wean them from brooders as quickly as possible. No hard and fast rules can be laid down either for artificially-heated brooders or cold brooders. We have to govern our actions by the climatic conditions.

A good illustration of the requirements of brooding is given by the hen. She regulates the heat to the chicks under her care according to the age and weather conditions. If the chickens are young she moves about very little and sits fairly close, gradually increasing the amount of range as the chickens develop. On a cold wet day you will notice her collecting the chickens frequently and warming them up. It does not matter what type of brooder is used, young chickens should be confined to a very limited space until they learn where it is warm. The range can then gradually be increased, and the more outdoor life and healthy exercise they have the better.

Temperature.

In artificially-heated brooders temperature is a very important factor. If insufficient heat is supplied the chicks crowd together. The correct heat is the only method by which this can be prevented. Over-heating is also to be avoided on account of its weakening effect and the difficulty that will be experienced in weaning from the brooders. The general comfort of the chickens is a sure index that the temperature is fairly satisfactory, and if the droppings are well scattered under the hover in the morning, it is proof that the chickens have been fairly comfortable. When the chickens are first put into the brooder, they come from a nursery in the incubator which generally has an average temperature of 90 deg., and it is as well to start your brooding at this temperature, gradually reducing it until heat can be dispensed with in from three to four weeks.

Ventilation.

More chickens are lost annually due to the lack of ventilation than by any other cause. Brooders which are usually made to hold a 100 day-old chickens are generally too small for the same number of chickens a week old. It frequently happens also that the attendant makes no allowance for additional ventilation with the growth of the chickens, and although he has been successful in rearing them to the age of one week they then start crowding and dying. The lack of ventilation has a great weakening effect on both young and old stock. It causes the young to crowd, and renders the older birds more susceptible to disease. When chickens have crowded they present a wet appearance in the morning, to which the term of "sweating" is applied. Sweating is not the cause. The wetness is caused by the condensation of the moisture content of the breath which would have been carried away if proper ventilation had been provided. Chickens which have been overcrowded rarely recover from the ill effects, and it should be avoided at all costs.

In brooding under any system the following are the essential points:—

(1) Limited range, increasing with age.

(2) Sufficient heat, which should be reduced as early as possible.

(3) Ventilation, which should increase with age.

(4) Correct accommodation. What is just enough room for 100 day-old chickens rapidly becomes too little as they grow.

(5) Never attempt to brood chickens of mixed ages.

The Colony Brooder.

Where a large number of chickens are to be reared the colony brooder is the cheapest and possibly as effective as any other type. With this class of brooder several hundred chickens can be run together with little more trouble than would be required for a lot of 100 under most systems.

Five hundred chickens should, however, be the limit in any one colony brooder, but possibly 100 less would give slightly better results.

The colony brooder consists of a heater having a metal hover for the purpose of deflecting the heat. The fuel used in some cases is coke, while other makes are built for burning oil. Whatever type of colony brooder is to be used a special house is necessary. This house should measure approximately 14 ft. by 16 ft., and be at least 6 ft. high. The roof may be either a hip-roof or skillion. The building should be lined and ceiled and provided with ample light.

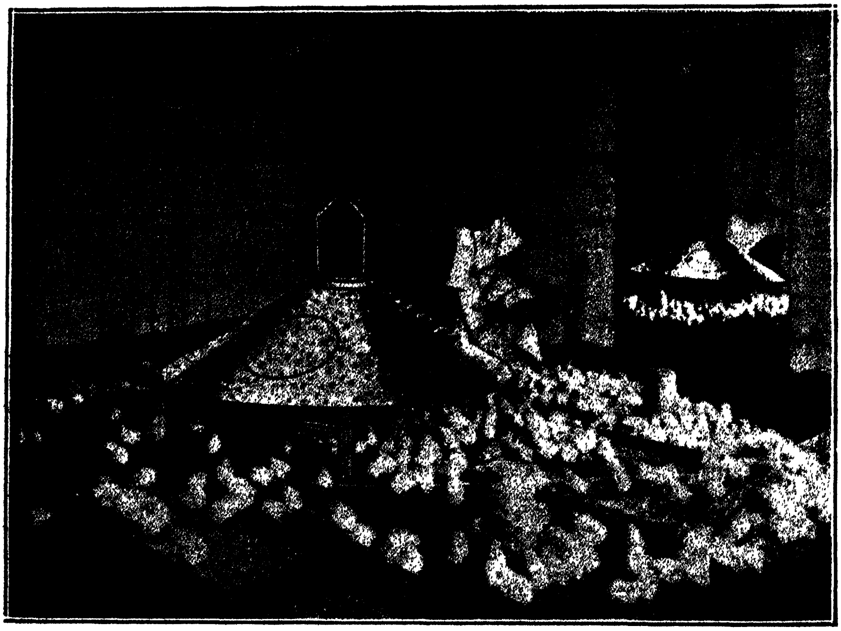

PLATE 123 (Fig. 1).—COLONY BROODER.

Note enclosure of wire netting restraining to some extent the liberty of very young chickens.

The house may be built with timber or iron. Iron is to be preferred, being of a more lasting nature, and at the same time it is not easily scaled by rats. The lining and ceiling should for preference be of ⅝-in. tongue and grooved pine, but for economy sake wheat sacks sewn together and whitewashed will serve. The floor should be concreted and the iron walls sunk into the ground to the depth of about 1 ft. This prevents rats burrowing under the floor, while the concrete floor is readily cleaned.

It is possible to make use of a less elaborate house for the operating of colony brooders, but it will readily be understood that a house not lined or ceiled will require a greater amount of heat to maintain the desired temperature, with the result of increasing the fuel consumption and attention to heaters.

Cold Brooding.

The term cold brooding is a misnomer. Under this system the heat of the body is retained by means of cloths or flannel and a restricted circulation of air. This method of brooding has been in operation for many years, but it is only recently that the practice has been adopted by commercial poultry breeders. The illustration of cold brooders will convey the nature of their construction. This cold brooder can be operated in brooder-houses or rearing-pens of simple construction. They have given excellent results in Queensland, and are extensively used by a larg number of breeders.

Placing Chickens in Brooders.

When chickens are to be placed in brooders from the incubators the floor should have a light dressing of dry soil to absorb any excreta and to give the chickens a good footing. A small amount of litter in the nature of chaff or short straw will provide exercise and tend to keep the chicks active, especially if some of the scratch grain is occasionally scattered among it. As previously stated, they should be confined somewhat until they learn where they can get warm, and after this encouraged to take as much exercise as possible by ranging either in specially erected runs or at liberty about the farm.

Cleanliness.

Cleanliness in every operation is essential; insanitary conditions not only pollute the atmosphere of the brooders but are frequently the cause of serious epidemics of disease. Where brooders and brooder-houses are thoroughly cleaned vermin cause little or no trouble. Brooder-houses should be cleaned out at least twice weekly, while a daily cleaning of the actual sleeping quarters is recommended.

Weaning.

When chickens are three to four weeks old it is generally necessary to remove them from the brooder-house to make room for younger ones. This is also necessary to protect the soil becoming contaminated by growing stock. Successful and correct brooding will materially assist these operations.

Colony-houses are possibly the most suitable for the housing of the chickens on leaving the brooder. These can be built on slides or wheels and moved about the fields or made fixtures. Under either conditions hurdles or netting-yard are necessary to confine the chickens until they become accustomed to their new quarters. After a week or ten days these hurdles can be removed, and, providing the rearing-houses are not too close, little or no trouble is experienced with chickens becoming mixed. The numbers put out together, of course, varies with the accommodation at your disposal, but larger flocks than 100 are not recommended, although cases are known where 300 were put out in one lot and no ill effects experienced. As the stock develop it is possible to cull out the cockerels. This leaves more room for your valuable growing pullets, and protects them from the attentions of the cockerels.

A good size rearing-house for 100 chickens is one 10 ft. long, 8 ft. deep, 6 ft. high in front, and 5 ft. at back, with a 3-in. space between the top of the back wall and roof to provide ventilation. The front should be open and netted in with a gate provided. This enables you to lock the house at night as a protection from predatory animals. A temporary curtain of bag covering half of the front will afford sufficient protection from winds, &c. When the chickens are first placed in this house they are too early to perch. Various arrangements can be made to protect them from crowding into the corner, but the writer has had the best results by bedding them down on baled straw. The straw needs to be fairly deep and loose, with the corners of the house well blocked. The chickens appear to be content to snuggle in the straw instead of making warmth by crowding together. It is then only necessary to go around in the evening with a fork and loosen the straw up, shawing the droppings through on to the floor, which can then be readily cleaned up.

Poultry are largely creatures of habit and can generally with care be trained to act as required. When once they form a habit—good or bad—it is difficult to alter. A little time spent in seeing that chickens go into the house of a night when first placed in a new yard or when they are first let out of the brooders into the netted runs will amply repay poultry-keepers by preventing losses through crowding.

Feeding.

There is a good deal of difference of opinion on this subject. Foods and methods of feeding which answer well with certain lots of chickens, and where operations are on a small scale, are not always workable where hundreds of chickens are to be reared.

Your primary aim is good healthy growth. The speed with which a chicken grows is very rapid, and nothing must be done that will retard it. You cannot be over-cautious in the feeding. Some animals can be neglected for a day and not experience

PLATE 124 (Fig. 2).—COLD BROODERS.

Showing numerous Cold Brooders being operated in a continuous house. Brooders taken from the house daily and placed in sun to air.

any ill effect, but a chicken is such a delicate piece of machinery that great care must be exercised always. When a chicken is born it weighs about 1½ oz., and in six months' time you want it to be a well-developed pullet of 4 lb. or more—that means that it has to make forty times its original weight in six months.

Chickens need no feed for at least forty-eight hours after incubation. Nature has provided for this period, as just prior to hatching the balance of the unabsorbed yolk is drawn into the abdomen, and under natural conditions this food supplies the chicken with its requirements until it has strengthened up. Feeding before this period sets up bowel trouble with the results of heavy mortality. Feeding should be done frequently—little and often is the best policy.

Kinds of Foods.

In deciding upon the kinds of foods that are necessary for growing stock, it is desirable to have some idea of the constituents of the body of the animal, as they must all be derived from foods. Slight variations in composition exist, but there is always a certain approximation to the normal, full-grown animal.

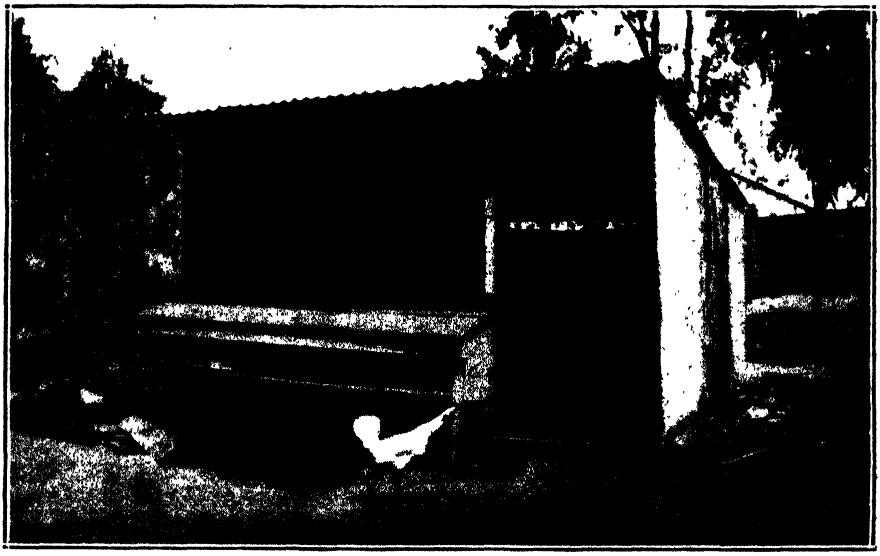

PLATE 125 (Fig. 3).—TYPE OF HOUSE SUITED FOR THE HOUSING OF CHICKENS AFTER LEAVING THE BROODERS.

Analyses made at the New York Experimental Station gave as an average of a Leghorn hen 55.8 per cent. water, 21.6 per cent. protein, 17 per cent. fat, and 3.8 per cent. ash. This is the composition of the whole of the body—bones, blood, feathers, and viscera.

The egg, which is potentially a chick, shows a striking resemblance in analyses to the body of a full-grown bird. Of the dry matter of the egg, apart from the shell, 49.8 per cent. is protein, 38.6 per cent. fat, and 3.5 per cent. ash.

It will be seen, therefore, that about half of the dry matter of the whole body is protein and about 8 per cent. ash. This suggests that slow growth would follow the use of foods which contain small amounts of nitrogenous and mineral matter.

Chickens at liberty consume large quantities of protein matter in the form of insect life, but it is not suggested that large quantities of meat-meal should be used. There are many excellent chick foods and growing mashes on the market, and it is questionable if it pays the individual to mix his own. Too many think it an unnecessary expense to purchase these foods, but, from remarks upon the necessity for the proper development of the stock and those upon the analyses of the bird, it is hoped that the necessity for the correct kinds of foods is demonstrated. Experience has taught us that a balanced ration is necessary for the feeding of chickens as well as for the production of eggs, and that this balance can only be made by using a variety of foods.

When the chickens are first placed in the brooder they should have access to grit or coarse sand. They will eat a little of this, and it will then be in the gizzard ready to deal with the food to follow. Grit should always be in evidence in the pens of chickens, and should consist of quartz or hard shell grit and charcoal.

Drinking water can be supplied immediately on leaving the incubator. This needs to be kept clean and replenished at least twice daily. The inverted bottle and tin is the cheapest water container.

For two days feed rolled oats on a bag or board. The chicks soon learn to pick this up. After this a mixture can be made of good cracked grains, such as hulled oats, skinless barley, wheat, and maize. Some of this grain should be scattered on the litter and the chicks taught to work for their living. This exercise promotes health, develops the bird, and frequently assists in checking the vice of toe-picking. From about four days a dry mash can be fed, composed of one part bran and two parts pollard. For every 20 lb. of the mixture add 1 lb. of the buttermilk powder and ½ lb. bone-meal and 2 oz. of salt. In mixing the salt, do so with a small quantity of the food first, and then add this to the bulk. By doing this an even distribution is made.

From 6 *to* 12 *weeks.*—The buttermilk can be replaced by ½ lb. of meat-meal and ½ lb. of bone-meal. The grain could remain the same, only increased in size. This feeding can be continued until the chicks are twelve weeks of age.

From the 12*th week until laying.*—The grain can be increased in size until full-sized grain is consumed, and fed once a day. The mash can also be altered considerably by the use of lucerne meal. The mash then could be made of the following constituents:—Lucerne meal, 12 lb.; bran, 26 lb.; pollard, 56 lb.; meat-meal, 2 lb.; bone-meal, 4 lb.; salt to be added at the rate of 10 oz. to the 100 lb. of mash.

Green Feed.

This is essential for the best results, and can be fed after a couple of days. Chickens in their natural state, at liberty, consume large quantities of the most tender growth of grass, &c. Lucerne chaff and lucerne meal are excellent substitutes for green feed, but they are not a suitable food for chickens until they are about at least three months of age. The most suitable green feeds are the tender-growths of barley, oats, &c. As the chicks grow they have rape, kale, or lucerne, but always feed it while tender and green.

Milk Feeding.

On a farm there is frequently a surplus of skim milk which can be fed to chickens with advantage. Some intersting experiments were carried out at the College of Agriculture, West Virginia University, on feeding chickens, in which skim milk was used, and it was found that chickens fed on a ration where milk was used—

(1) Consumed more grain;
(2) Grew more rapidly;
(3) Laid earlier than chickens fed on similar foods without milk; and
(4) The mortality in the milk-fed chickens was not so heavy.

The milk may be fed in either a sweet or sour state. If sour, it is claimed by some authorities that it assists in preventing outbreaks of coccidiosis and white diarrhœa. Although dry mashes are recommended, small quantities of wet mash mixed with milk are very beneficial, and, where large quantities of milk are available, animal food in the form of meat-meal or buttermilk is not necessary.

THE MODERN FARMERS' NEED.

A *Nutgrove* (*Cooyar Line*) *farmer writes* (*24th July,* 1929):—*"I wouldn't miss my Journal. . . . Keep up the publication. It is one of the best and cheapest and contains the knowledge an up-to-date farmer needs."*

General Notes.

Staff Changes and Appointments.

It has been approved that Mr. W. D. Lewis be further seconded for duty as Temporary Inspector under and for the purposes of "*The Diseases in Plants Acts,* 1916 *to* 1924," as from 1st July, 1929, until 31st December, 1929.

Senior Sergeant W. O. Ingram now stationed at Cairns has been appointed an Inspector of Slaughter-houses as from 18th July, 1929.

The services of Mr. C. G. Munro, as Manager, State Farm, Home Hill, are to be continued until 30th June, 1930.

The services of Mr. J. H. Mitchell, Inspector under the Diseases in Plants Acts, are to be continued until 31st December, 1929.

Mr. A. E. Adcock, of Dalby, has been appointed an Acting Inspector of Stock as from the 1st August, 1929.

Acting Sergeant F. Conaty has been appointed an Inspector of Slaughter-houses as from the 17th August, 1929.

The following have been appointed Assistant Cane Testers for the forthcoming sugar season to be employed at the following mills:—Miss E. M. Mullin, Plane Creek; Mrs. M. E. Nally, Babinda; Miss T. M. Payne, Invicta; Miss A. Murray, Moreton; Mr. St. C. G. Fanning, Pioneer; and Mr. D. Walton, North Eton.

Messrs. W. J. Ross and H. J. Freeman have been appointed Senior Instructors in Fruit Culture, Fruit Branch, Department of Agriculture and Stock, and Messrs. H. Barnes, H. St. J. Pratt, S. E. Stephens, R. L. Prest and E. F. Duffy have been appointed Instructors in Fruit Culture, Department of Agriculture and Stock.

Fruit Marketing Regulations.

Regulations under "*The Fruit Marketing Organisation Acts,* 1923 *to* 1928" have now been passed providing for the election of members of the Banana, Pineapple, Citrus, Deciduous and Other Fruits Sectional Group Committees, and also for the amendment of Form 5 which the secretary of every Local Association shall, when required by the Committee of Direction of Fruit Marketing, forward to the office of the Committee in Brisbane giving particulars of his roll of members. The Fruit Marketing Organisation Act Amendment Act of 1928 provides that a Sectional Group Committee shall not consist of more than ten members, and in accordance with this stipulation the new Committees shall consist of—

Banana Sectional Group Committee	10 members
Pineapple Sectional Group Committee	10 members
Citrus Sectional Group Committee	9 members
Deciduous Sectional Group Committee	9 members
Other Fruits Sectional Group Committee	8 members

The Regulations state definitely the Local Associations and Groups of Local Associations which shall constitute an electorate and the number of members to be elected by each electorate.

Diseases in Plants—New Proclamation.

Proclamation No. 4 under the Diseases in Plants Acts has now been rescinded and a new Proclamation been issued in lieu thereof. Under the old Proclamation, the introduction into Queensland of plants or portions of plants of all and every species of grape vine was absolutely prohibited, but the introduction of grapes from New South Wales and Victoria was permitted, provided the consignments were accompanied by certain certificates as set forth. The introduction into Queensland by sea from South Australia and Western Australia of grapes was also permitted.

The new Proclamation makes provision for the above, but in addition provides that grape cuttings from South Australia or Western Australia may be introduced for a period of eight weeks from the 15th August, 1929, on the condition that the cuttings are accompanied by a certificate from the Horticultural Instructor of South Australia or the Superintendent of Horticulture of Western Australia, as the case may be, setting out that the cuttings are entirely free from any disease of the grape vine and are from a district entirely free from Phylloxera. So far as is known, both South and Western Australia are free from Phylloxera, and have no diseases of the grape vine which do not already exist in Queensland.

Man not a Robot.

"Modern educationists have to realise that in this mechanised life man is not a robot, but has a soul to put into his work," said Mr. C. Sydney Jones, High Sheriff of Lancashire, speaking recently on "Industry and Education." "One of the great duties of education to-day was to give vision to the people. However clever our mechanics might be, we should not be able to hold our own in the world unless we had that soul which only came from the intellect and the spirit."

Close Season for Game.

An Order in Council has been made altering the Close Season for Goose and Duck in Queensland. In District No. 1 (Northern Queensland) the period of close season is from the 1st October in each year to the 30th April in the following year inclusive. In that portion of District No. 2 situated north of the 22nd parallel of south latitude (Central Queensland) the period of close season is from the 1st November in each year to the 31st May in the following year inclusive, while in that portion of District No. 2 south of the 22nd parallel of south latitude (Southern Queensland) the close period extends from the 1st December in each year to the 30th June in the following year inclusive.

Importation of Infected or Suspected Pigs—Prohibition Renewed.

The Order in Council prohibiting the introduction into Queensland of any infected or suspected swine or any carcass or portion thereof of infected or suspected swine from the States of New South Wales, Victoria, South Australia, Western Australia, and Tasmania has been renewed for a further period of twelve months. This Order in Council shall not apply to or affect the introduction into Queensland from the said States of bacon, hams, and cured or dressed pork if no viscera or portion thereof, in an uncooked state is introduced therewith. The introduction of viscera or portion thereof in an uncooked state is prohibited. Further, pigs for immediate slaughter, which in the opinion of an inspector are healthy, may be admitted with the approval of the Minister for Agriculture under such conditions as may be imposed by him.

The Real America.

"Most generalisations about the United States may be set down as false. The country is too vast, its life too many-sided, and the elements of it too heterogeneous, to be covered by any single formula. For example, it is not true that the people are bound body and soul to the worship of the 'almighty dollar.' Vast numbers of them are, but the forces which resist materialism are also in evidence, and are active everywhere. The intellectual life of America is marked by an intense eagerness to learn. One might almost say that the American mind welcomes disturbance by new ideas. The hunger for knowledge is widespread, like the diffusion of wealth. It is true that knowledge is mostly valued as a means of earning money, but that is by no means the end of the story. The interest in education is widespread, and though the quality of American education has many glaring defects, these defects are well known to the leaders of American thought, and immense efforts are being made to remove them."—Principal Jacks.

The Royal Society of Queensland.

The ordinary monthly meeting was held in the Geology Lecture Theatre of the University on Monday, 29th July, at 8 p.m. The President (Professor J. P. Lowson) was in the chair.

The secretary (Mr. F. A. Perkins) read extracts from a paper by Dr. John Legg entitled "Some Observations on the Life History of the Cattle Tick."

Dr. W. H. Bryan and Dr. F. W. Whitehouse read a paper entitled "A Record of Devonian Rhyolites in Queensland." The paper reviewed the evidence of the occurrence of Devonian rhyolites at Kangaroo Hill and Mount Coolon, and placed on record several other rhyolitic series (some of proved Devonian age and others apparently belonging to that period), discovered by one or other of the authors within the last few years, from the following localities:—Herberton, Mount Etna, Tungamull, Mount Morgan, Raglan, Gore.

Dr. W. H. Bryan exhibited: (1) An amethyst-coloured specimen of halite (rock salt) obtained by the Chief Government Geologist (Mr. B. Dunstan) from the Kaiserrode Mine, Borken, Germany; (2) a specimen of decomposed but unweathered granite from the Ashgrove Quarry, Brisbane, containing purple crystals of fluorite associated with quartz and zeolites. This marked the first record of fluorite from the Enoggera granite.

Open Season for Ducks.

As a result of an Order in Council issued on the 8th instant, a variation of the open season for goose and duck in certain portions of Queensland is provided for. The present open season in No. 1 district of the State, which includes Southern and Central Western Queensland, has been extended to the 30th September next, and thereafter the season will be closed until the 1st May next. In that portion of No. 2 district situated south of the 22nd parallel of south latitude, and which includes an area approximately bounded by St. Lawrence on the north, Bororen on the south, and Clermont on the west, the season will be open until the 30th November next, and will be closed thereafter until 1st July next. In the northern portion of the State the present open season will extend to 31st October next, and will be closed thereafter until 1st June next. This will provide an open season of five months in each year throughout Queensland.

The State Clydesdale Stud.

The Minister for Agriculture, Mr. H. F. Walker, has announced that six years ago six Clydesdale stallions were purchased by the late Government and their services were utilised in different districts for the improvement of the draught horse stock of the State. Altogether 1,670 mares were mated, and as a result, from the satisfactory number of foals each year, there had been a decided improvement effected in the type and quality of the young draught stock in the agricultural districts where these sires were used. It had been decided, however, that in future this practice will be relinquished, in so far as the State ownership of the stallions is concerned, and that the four stallions—General Wallace, Premier Again, Bold Wyllie, and Prospector—were to be offered at auction at the Exhibition sales. All the horses have been regularly exercised and are in first-class condition, and in consequence they should be fit for the approaching season's duties. In the hands of good horsemasters these stallions should have several years of useful stud work before them.

Out of Doors.

"You have noticed how colour is brought to the cheeks by exercise in the open air, how the functions are quickened, and the spirits lightened—there is an exhilaration to be imbibed such as no artificial therapy can promise. Pure atmosphere contains elements of nourishment, as necessary as the daily portions we attack with knife and fork. Invisible, it yet sustains and purifies—it is the one item of our dietary to be taken without fear of surfeit," says Reddie Mallett, in "Nature's Way Monthly." "Not a soul has truthfully said that fresh air had undermined his strength. Cows, grazing in the fields, give better milk than those stall-imprisoned; the latter inhale less nitrogen, and thereby suffer. Get out of doors, then; let the kiddies draw from the illimitable fount of health."

The Fountain of Wisdom.

"Wisdom, after all, comes by suffering, and, though no doubt it is easy to point to some limiting and narrowing consequences of the particular facts of his life, the splendid genius of Dickens, far from being, as it might have been, embittered or undermined, emerged from a long series of ordeals not only with strength undiminished and brilliancy undimmed, but, perhaps, also with no little gain in tenderness, in insight, and in sympathy. And so it came about that, although, perhaps, he reaped and enjoyed too little of 'The harvest of a quiet eye that broods and sleeps on his own heart,' nevertheless, this sad man was able to make others laugh; this unhappy man was able to make others forget; this great-hearted poet in the true sense of the term, himself self-educated, was and will be the cause of education in millions of his fellowmen."—The Lord Chief Justice of England, Lord Hewart.

The Age of Power.

"We are living in a power age. Power must be properly used, or it will destroy us. We are due for a big change in educational methods. That is one of the reasons why we are at present trying out our trade-school form of teaching. It seems to be the tendency of our generation to want things in tabloid form. . . . Such a process is likely to stunt our reflective power. . . . The great problem in the home to-day is that there is too much drudgery there. . . . There has been no decrease in the hours of wives. We should spend more time in the study of food and how to eat it. Most of us eat too much. We eat the wrong kind of food at the wrong time, and ultimately suffer for it. When men are job-centered they are less self-centred, and there is, therefore, less soil for the interference of personal likes and dislikes, personal pride, and personal prejudices."—Mr..Henry Ford.

Wool Baling.

When baling wool, the bales should be as even in weight as possible. Between 300 lb. and 336 lb. is a good weight for fleece wool, "pieces," "bellies," &c., usually being heavier. To get fairly even weights of fleece wool it is a good idea to count the fleeces into the bale, and when it is weighed one has a guide to go on. In a small clip a few mixed bales are unavoidable, but as few as possible should be made, and when two lots of wool are put in the one bale, be sure they are of about the same value, because the bale will always be valued on the lowest wool in the bale. It pays the farmer to market his wool clip as far as possible in even lots—even in quality, length and condition.

When Feeding Scrub Supplement the Ration if Possible.

Native scrub and trees such as kurrajong, wilga, mulga, myall, willow, currant bush, emu bush, gidgea, and whitewood have a considerable value during such times as those through which pastoralists are unfortunately now passing, but it must always be borne in mind, writes an officer of the Stock Branch of the New South Wales Department of Agriculture, that these are only emergency fodders. They do not provide a balanced ration: and while alone they may keep up the health of stock for a limited period, eventually condition will be lost and signs of digestive disturbance be noted. In any case they are entirely unsuited to lambing ewes. Their value is much increased by—

1. The addition of small amounts of grain or meal concentrates daily, say, 4 to 8 oz. per sheep.

2. The addition of salt, Epsom salts, and molasses in the form of a lick. This acts as a corrective, and lessens the liability to impaction of digestive organs. The proportions might be—1 part Epsom salts, 3 parts Liverpool salt, 4 parts molasses. The amount of Epsom salts might be increased if deemed necessary. Sulphate of iron, although it is recommended as a good tonic in normal seasons, should not be used, as it is an astringent and increases the liability to constipation.

3. Add a little hay to the above ration. If hay is added even only once or twice a week the stock would resist the adverse conditions more successfully.

Making Concrete—Material Required.

The question is often asked, "How much cement, sand, and metal will be required" for a particular job when making concrete. The table given below, which shows the cubic feet of cement, sand, and stone needed for 1 cubic yard of various mixtures, will, in conjunction with the appended explanation, enable the computation of the necessary quantities:—

Materials required for 1 cubic yard of concrete.

Mixture.			Cubic Feet.		
Cement.	Sand.	Stone.	Cement.	Sand.	Stone.
1	2	4	5·84	11·88	23·76
1	2·5	4	5·44	14·04	22·14
1	2·5	5	4·76	12·42	24·57
1	3	5	4·52	13·77	22·95
1	3	6	4·00	12·42	24·84
1	3	6·5	3·84	11·88	26·65

If, for instance, it is desired to lay a concrete floor 4 inches thick gauged 1:3:6, in a room 12 feet by 14 feet, the total quantity of concrete required will be 12 x 14 x ⅓ = 56 cubic feet = (approximately) 2 cubic yards. From the table of quantities for a 1:3:6 mix it will be seen that for 1 cubic yard of concrete the materials required are 4 cubic feet of cement, 12.42 cubic feet of sand, and 24.84 cubic feet of metal. Therefore, for 2 cubic yards twice these quantities will be required. If, say, 8 cubic yards of concrete were required for a job, the quantities in the table would be multiplied by eight. As a bag of cement contains 1 cubic foot, the quantity of cement required, as computed in cubic feet, is the quantity in bags.

For rendering, a bag of cement mixed with two equal bags of sand will cover about 8½ square yards, ⅜-inch thick, and 6½ square yards, ½-inch thick.

Green Pea Cultivation.

Growers of green peas are reminded of the importance of an early preparation of the soil.

The water requirements of a crop of peas are considerable, and the preparation of the soil should be commenced sufficiently early to enable a supply of moisture to be stored. The land should be cultivated as required to conserve all rain that falls, to destroy weeds, and to produce a good tilth in which the roots will find favourable conditions. Every effort should be made to induce germination of weed seeds before the crop is planted. If this is done the subsequent cleaning of the crop will be much easier. During the picking season there is often little time to attend to the destruction of weeds, hence the necessity for thorough cultivation during soil preparation and early stages of growth. A good strike of weed seeds can usually be controlled by harrowing, which is so much quicker than inter-cultivation work, which would be necessary once the crop is planted.

A sandy loam is most suitable for the crop, but almost any soil of fair average quality will yield good results. As with all legumes, the supply of nitrogen in the soil is matter of less moment than that of phosphoric acid, potash and lime, and hence it is that in some localities dressings of fertilisers that contain the last three have a material effect upon the yield. The crop has the strong recommendation that, in addition to yielding profitably, it contributes to the fertility of the soil for the purpose of subsequent crops by increasing the store of nitrogen, and by enabling the gardener or farmer to add to the soil a considerable quantity of top-growth of a kind that humifies readily when turned under. It does well on newly broken land, and can be used as a preparation crop.

Points in Citrus Packing.

Though citrus fruits do not show injury from bruises for some time after picking, in reality the oil cells of the skin are very easily damaged, and it is through such injuries to the skin that decay germs, such as those causing blue mould, make their entrance; hence great care is necessary when picking and packing for market. Gloves should be worn or the finger nails kept extremely short, and the fruit should be clipped with the button adhering but with no length of stalk to come into contact with and puncture other fruit. The fruit should be placed right into the picking receptacle, and not dropped in from the top, and the same care should be exercised in all subsequent handling between picking and packing.

Though paper lining, by checking the circulation of air in the case, may tend to produce conditions favourable for the development of blue mould, the rough timber of unlined cases injures the skin and allows infection by the disease, so that lining paper is an advantage when packing citrus fruits, unless the inside of the case is planed, as is done in some other countries.

The proper packing of fruit is of great importance, as growers are now realising. Space packing has now become almost universal, and it certainly is the best method to adopt in packing fruit, as the work can be done quickly, and the fruit carries well. Moreover, the pack is attractive and is liked by buyers.

The Prayer of a Horse.

"To thee, my master, I offer my prayer."

"Feed me, water, and care for me, and when the day's work is done, provide me with a shelter, and a stall wide enough for me to lie down. Talk to me. Your voice often means as much to me as the reins."

"Do not whip me when going uphill. Don't beat or kick me when I do not understand what you mean, but give me a chance to understand you. Watch me, and if I fail to do your bidding see if something is not wrong with my harness or feet."

"Examine my teeth when I do not eat. I may have an ulcerated tooth, and that, you know, is very painful. Do not tie my head in an unnatural position, or take away my best defence against flies and mosquitoes by cutting off my tail."

"And, finally, oh, my master, when my useful strength is gone, do not turn me out to starve, or sell me to some cruel owner to be worked and starved to death; but do thou, my master, end my life in the kindest way. You may not consider me irreverent if I ask this in the name of Him who was born in a stable."—Translated from the Arabic.

Lucerne—A Reminder.

The value of top-dressing lucerne with superphosphate as a means of increasing the yield has been proved by trials in various parts of the State. Lucerne, being a legume, can gather nitrogen from the air, and by means of its wonderful root system can traverse a wide area in search of the other necessary plant foods, but the crop makes heavy demands on the soil, and if the stand is to last as long as possible and to yield the utmost profit nothing must be neglected that will help to invigorate and maintain it. The usual cultivation in early spring is not sufficient if the best results are to be obtained.

Top-dressing with superphosphate is advantageous in four ways:—

(1) The green fodder yield is greatly increased.

(2) A better quality product results—in fact, a healthy, dark-green colour is noticeable throughout the whole growing period.

(3) The general condition of the stand is built up consequent upon the vigorous growth developed.

(4) The useful life of the stand may be extended, and depleted stands largely restored.

Recent experiments indicate that the early spring is the best time to apply dressings of superphosphate. It is advisable first to stir the surface soil with a springtooth cultivator, and then to apply the superphosphate through the wheat drill, with the tubes loosely adjusted so as to give a broadcasting effect, or use a top-dressing machine to spread the fertiliser. Where there is no wheat drill or top-dressing machine, as on a good many coastal farms, it is better to broadcast the superphosphate by hand than to neglect the operation.

The dressing should be at the rate of about 2 cwt. per acre; where the method is broadcasting a slightly heavier application can be made with advantage.

The Laying of Poison Baits for Animals.

The Society for the Prevention of Cruelty has approved of the following standing warning:—Persons laying poison on their property are reminded that it is unlawful for the occupier of any town or suburban land to lay poison on his land for the purpose of destruction of dogs or other animals. The occupier of any land beyond the limits of the town or suburban lands may lay poison on his land for the purpose of destroying dogs, but notice of such being laid must be advertised in three successive issues of any two papers circulating in the district where such land is situated or in the "Government Gazette," and must also be conspicuously exhibited on such land, and in no case, must the poison be laid within two hundred yards of any public road.

SOME FIRST-AID REMEDIES FOR POISONED ANIMALS.

Emetics.—The quickest is 20 grains of sulphate of zinc, dissolved in half a tumbler of water. Failing that, a dessertspoonful of mustard mixed in a tumbler of lukewarm water, or even the warm water alone with or without a tablespoon of common salt in it. A quid of pipe tobacco pushed down the throat can be used in emergency.

After cleaning the stomach, give large quantities of milk, whiting scraped off a wall, and water, white of eggs, butter, or any sweet oil.

It is best to administer doses of liquid by closing the dog's mouth, drawing one corner of its mouth outwards so that the lower part of the cheek forms a pouch, and pouring medicine into same a little at a time as the dog swallows it. Do not hurry, or you may choke the dog, and be careful not to interfere with the breathing by pressing on the nostrils.

If magnesia is unprocurable, use lime or the scrapings off a white-washed wall.

Arsenic Poisoning.—Symptoms: Intense pain, heat and tenderness of stomach, distressed and painful breathing, vomiting and diarrhoea.

Treatment.—Give emetic and large quantities of oil and butter; 4 oz. of magnesia in water. Keep up strength with wine or spirits and water.

Phosphorus.—Give emetic and repeated doses of magnesia in water, followed by one teaspoonful of turpentine in a little milk.

Strychnine.—Symptoms: Violent and continued spasms.

Treatment.—Give emetic, then extremely large doses of spirits and water, or of chloral.

Tyred Pedestrians—The Shoes of the Car Become the Shoes of Man.

A brisk trade in a new type of footwear is being created by the cobblers of Albania, Turkey, and parts of Persia. They are making shoes out of old "Dunlop" tyres by the simple process of cutting well-worn motor tyres into the required lengths, fashioning a toe and tongue, and lacing a thong of leather around the top to bind the whole together. The finished article resembles a Dutch sabot, and a traveller who has just made a tour of the Near East reports that in the bazaars the demand for the new shoes is great, because they cost less and wear longer than sandals or the more modern boot.

Hydatid Disease—Its Nature and Control.

What are "hydatids," in what way is the disease contracted, and by what means can it be controlled? These questions are of particular interest to country dwellers, because the country dog is the most common agent of man's infestation. The character of the disease and the measures necessary for its control are the subject of an informative article in a recent "New South Wales Agricultural Gazette."

Hydatid disease, it is stated, is perhaps the most important parasitic disease of man in Australia. It is caused by the presence in the internal organs of large bladder-like cysts, which are larval or immature stages in the development of a very small tapeworm of the dog. Cattle, sheep, and pigs are all very commonly affected.

The adult tapeworm referred to is so small that unless very carefully looked for it will not be seen. The eggs of the worm pass on to the soil, and may remain there for some weeks, but cannot develop unless swallowed by either man or some other animal. In the case of domestic animals the eggs are swallowed with the grass as the animals graze over the infected pastures. They hatch in the intestines and a minute larval worm emerges, bores into the bowel wall, and enters a blood vessel. It is then carried to the liver, lungs, or other organ and development into the cyst proceeds. These cysts interfere with the normal functions of the organs. If a liver or other organ containing this cyst is eaten by a dog, the tapeworm head enclosed in the cyst attaches itself to the wall of the dog's bowel and develops again into the adult worm.

How Man Becomes Infested.—Man cannot become affected from eating the cysts of sheep or cattle, and if no dogs were allowed to eat organs containing these cysts all danger of man contracting hydatid disease would cease. One of the methods by which man most commonly becomes infested is by carelessness in handling country dogs, inasmuch as if the dog happens to have some of the eggs of this tapeworm on its coat they may be transferred to the man's hands and thence to his food if he neglects to wash his hands, and so into his system. The danger is naturally greatest in the case of children, who exercise less care in personal cleanliness.

Contaminated water and green vegetables, which were at one time regarded as the most common sources of infection, are probably not comparable in importance with that just mentioned. It is possible that flies may infect food with the eggs of the tapeworm, which is another argument for the many in favour of fly control. The cleanly habits of the house cat make it a less probable source of infection than the dog. Foxes and dingoes are probably an important factor in the infection of stock.

Unfortunately, the presence of tapeworm in a dog does not give rise to any noticeable symptoms. From the circumstances under which they live, country dogs are far more likely to be infected with this tapeworm than city dogs.

Control.—Control of the disease may be attempted in two ways—firstly, by preventing infection of man and herbivorous animals, and, secondly, by preventing infection of the dog. The second is the more important factor.

Since the dog can only become infected by eating hydatid cysts in raw meat, the complete prevention of this habit would go very far to eradicate the disease in man, and would be a considerable step forward in preventing the disease in animals. The dogs most likely to be fed on raw meat containing hydatid cysts are station dogs and slaughter-yards dogs. Where sheep are killed on a holding for rations the greatest care should be exercised to see that no infected organs are thrown to the dogs to eat. They would, of course, be quite harmless if boiled for ten minutes. Keeping the organs and feeding them later will not prevent the dogs from becoming infected, as the cysts may, in winter, remain alive for some weeks. No dog should be allowed into slaughter-houses, and on no account should raw organs containing hydatid cysts be given to them to eat.

Only water from a source which cannot become contaminated by the excrement of a dog should be used for washing down slaughter-houses, and every effort should be made to keep dogs free from tapeworms.

"Do" and "Don't" in Poultry Marketing.

Here are some humane reminders taken from the last annual report of the Queensland Society for the Prevention of Cruelty.

"DO."

Do see that poultry are not overcrowded in crates.

Do see that your crates are not left out in all weather conditions at railway stations awaiting despatch.

Do send timely advice to the consignee so that poultry may be promptly called for and not left at a railway station famishing for food and water.

Do see that suitable tins are secured in opposite corners of your crate and filled with water, also arrange for refilling on transit or while the birds are awaiting sale.

"DON'T."

Don't place poultry in a crate of less height than the birds placed therein.

Don't put poultry in a crate with open spaces between the bottom boards. This causes the birds to get their legs broken or injured. Crates should be constructed with a wooden frame and bottom, and wire-netting sides.

Don't overcrowd your crates. The following dimensions of crates are given for guidance of consignors:—

For twelve pigeons and chickens the crate is required to be 2 feet long, 14 inches wide, and 9 inches high.

For twelve fowls or common ducks, 3 feet 6 inches long, 2 feet 6 inches wide, and 18 inches high, or a space of about 1¼ cubic feet per bird.

For ten geese or turkeys, 6 feet long, 2 feet wide, and 2 feet 6 inches in height, or a space of 3 cubic feet per bird. This crate should be cross partitioned, keeping the birds in two lots.

Any alteration in the number of birds could be met by a corresponding alteration in the size of crates.

Don't send poultry with their legs tied together or tied to other birds.

Don't send turkeys or geese in a crate with smaller poultry, such as fowls or ducks. It involves cruelty to the smaller birds.

Don't forget in consigning poultry to market contrary to conditions set out, or in any manner which involves cruelty, leaves the consignor liable to a fine of £25 or six months' imprisonment.

Don't forget that the inspectors of the Queensland Society for the Prevention of Cruelty visit the poultry market, and that henceforth the law will be enforced, and that court cases are costly in time, money and reputation.

A similar circular was distributed per medium of the "Poultry Farmers' Journal" to over seventeen hundred poultry raisers, and the circular has been supplied to the poultry dealers who have promised to send out copies with account sales to their clients. In this way almost every raiser has been reached. So that from now on, pleading ignorance of the law cannot be accepted as an excuse.

We are glad to be able to say that as a result of the action taken a very great improvement has been effected, and the poultry farmer will profit because the heavy loss in birds will be avoided.

A USEFUL JOURNAL FOR THE FARMER.

A Kingaroy producer writes (13th August, 1929):—"It is with much pleasure that I forward my renewal subscription for the 'Queensland Agricultural Journal.' I feel grateful . . . . for its usefulness to the man on the land."

British Thrift.

"The volume of capital owning by the mass of the people is now immense. Despite the lean years, in which many 'nest-eggs' have been used up, the Trustee Savings Banks hold for 2,410,000 depositors nearly £114,000,000 in deposits and £33,000,000 in stocks or bonds, while the ten million accounts in the Post Office Savings Banks amount to over £284,000,000," says a writer in the "Quarterly Review." "Meantime War Savings Certificates, already in 1918-19 amounting to just short of £227,000,000, now total £362,000,000, and in 1925-26 even rose to £375,500,000 (interest in each case being omitted from these figures). The consumers' co-operative movement has capital and reserves of little short of £170,000,000, while another £91,000,000 is held by Friendly Societies. But perhaps most striking, as showing the development since pre-war days, are the figures of the Building Societies. With some 600,000 members and assets of £61,000,000 in 1914, their membership is now well on the way to 2,000,000 persons, and their assets have increased to £225,000,000."

Some "Don'ts" for Horse Owners and Drivers.

Don't fail to rug your horse when he stands in the cold.

Don't forget that ills often result from exposure and chill which follows suddenly-checked perspiration.

Don't fail to keep your horse well shod.

Don't work a lame horse or you may make a temporary injury a permanent one.

Don't let any alleged blacksmith lame your horse. Do you cut your own feet down to fit your boots? Well, don't forget that your horse's shoes should be shaped to fit his feet, and not his feet shaped to fit his shoes.

Don't load your horse too heavily, especially when the streets and roads are wet and slippery.

Don't force him to back a heavy load over a slippery road or uphill.

Don't fail to oil your wagon axles. There is a heap of humanity in wagon grease.

Don't put badly-fitting harness on your horse.

Don't forget that there is more profit in coaxing a horse than in kicking him.

Don't thrash your horse if he jibs. Lift his collar and wipe it and his shoulder, and let the air at them; then tie your whip thong round his foreleg just below the knee and pull his leg forward to start him. Try it.

Railing Stock to Market.

Another extract from the same report:—This is another matter that the Society has been concerned about for some years. The Society keeps hammering away on the subject. We have got in touch with the Railway Department, the United Graziers' Association, and the Brisbane Fat Stock and Produce Association, through whom most of the stock are sold at Newmarket Sale Yards. The Commissioner for Railways seems to be really anxious to minimise the trouble, realising as he does, the heavy losses sustained. An instance of which it may be mentioned that in January last, of the cattle arriving and handled at Newmarket Sale Yards, 26 head were dead and over 200 head injured. Fat bullocks at that time were bringing from £10 to £12 per head. The dead bullocks are disposed of to a pig farmer at a mere nominal sum, and the injured at a very much reduced price, so that the loss sustained during that month may be reasonably approximated at about £1,000. These losses are mainly due to want of care in long railway journeys. A competent careful man should accompany every cattle train, look over all trucks at every stopping place, and get the assistance of the train crew to lift any cattle that are down. This with more careful loading and unloading would minimise the trouble considerably, and in this connection it may be mentioned that the officers of this Society, who visit the sale yards frequently, on one occasion found over 20 sheep horns embedded in the ground where a truck of sheep had just been unloaded. Instead of using a ramp or gangway, which was provided by the Railway Department, for the sheep in the top story of the truck, they were forced out by the employees at the sale yards, a number of the sheep falling on their heads drove their horns into the ground, and in releasing themselves wrenched off the horns. The visits of the Society's Inspectors have considerably checked this rough work, but they cannot attend the unloading of every stock train, and the Society gets very little encouragement from stock owners, only in one instance, and that by the Warrego Branch of the Graziers' Association has our work been recognised.

The Home and the Garden.

OUR BABIES.

Under this heading a series of short articles by the Medical and Nursing Staff of the Queensland Baby Clinics, dealing with the welfare and care of babies, has been planned in the hope of increasing their health and happiness and decreasing the number of avoidable cases of infant mortality.

WHAT EVERY BABY NEEDS.

A good deal has been written in these pages concerning the importance of the correct feeding of infants, but so far little mention has been made of other factors which require regular and daily attention. With good feeding alone, even the best possible feeding with mother's milk, we cannot hope to attain the highest standard of health for baby, though, as will be pointed out later, careful feeding will ensure that other of his needs are also receiving attention.

Doctor Sir Truby King, of New Zealand, the world-famed authority on infant welfare, has called the points which should receive daily and careful attention, the "twelve essentials" for baby's health.

Fresh Air for the Infant.

The first essential is fresh air. In his earliest months, more than at any other time in his whole life, baby requires pure fresh air. Not only is it required to purify the blood, but at this time baby is growing very quickly, and for this reason also it is important that the air he breathes should be of the purest and freshest. Most mothers see that baby has fresh air in the daytime by putting him on a veranda to sleep, but at night, when his need is just as great, he does not always fare so well. Not infrequently, the baby shares his mother's bed, where he lies cuddled in to her side, and perforce is breathing stuffy and used-up air. Some mothers think that baby, sleeping by himself, would not be sufficiently warm, but the healthy baby who is comfortably warm when put to bed, does not require the warmth of his mother's body to keep him so. When the weather is very cold he could have a hot bottle or rubber bag in his cot, carefully covered, and so placed that he could not be burnt by it. At night he should sleep in a well-ventilated room, with doors and windows open to permit of a constant moving current of fresh air. This should be the rule, summer and winter. Even in winter, in Queensland's beautiful climate, baby could sleep on a veranda. Pure, cold air will do him no harm. The cot, whether in a room or on the veranda, should be placed so that it is not in a draught. The baby who is accustomed, day and night, to fresh air, is much less likely to contract colds and other illnesses than the one who sleeps at night in a stuffy room. Another way of depriving a very young baby of the air it needs is by pinning a handkerchief to the front of its bonnet when it is taken out, so that the handkerchief lies over the little face. This is done with the intention of protecting baby's eyes from glare, but it is possible to hold a baby so that its eyes are protected from the light without depriving it of air. If the mother once tried going for a walk for an hour, with a handkerchief close against her face, she would, long before that time was over, feel the need for more air, and would not again treat her baby in that way.

Leather-hooded perambulators, some of which do not permit of free ventilation, can be stuffy and unhealthy.

The Value of Clean, Cold Water.

Another essential for baby is water. From birth babies should be given some plain cool water daily. They get thirsty at times, just as grown people do, especially in the summer when the skin acts freely. Milk is food and not a drink for the baby, and will not quench his thirst and satisfy him when he is thirsty, as well as some plain cool boiled water. For the baby who is fed on his mother's milk, a spoon and cup should be used, and for the "bottle baby" his feeding bottle. He soon learns to like, and to look for, his drinks of water. In illness, the habit of water drinking can be valuable. The sick baby who, from any cause, has his food lessened or stopped, and who refuses to drink water, has a poorer chance of recovery than the one who drinks plenty of water. Give him as much as he likes; it will not hurt him, whether he is ill or well.

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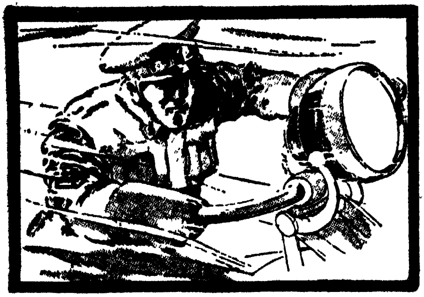

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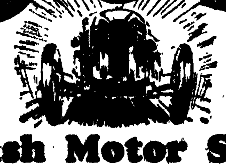

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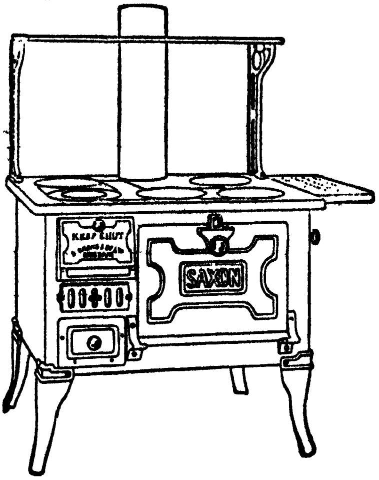

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Saxon Fuel Stove

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SPECIAL FEATURES:

(1) Body and Oven of stove are constructed of extra heavy sheet metal which assures long life.

(2) Loose firebars which are easily replaced.

(3) A Cast Iron Crown Plate which prevents the top of oven burning out.

(4) Vital parts of stove are protected by specially made fire bricks which give the stove practically unlimited life.

The Saxon can be had with low or elevated legs and many extra convenience features. See at your store. Write us direct if unprocurable.

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Brookes Street
VALLEY, BRISBANE

Suitable Clothing.

Suitable clothing is another essential. In clothing a baby the most important point to remember is that the first, and main object, should be comfort for the baby. The patterns should be simple, so that the garments are easy to put on and take off. They should hang from the shoulders and have no tight bands to hinder development. The materials used should be porous, non-irritating, and light. The clothing should be loose and either warm or cool, as the weather and the child's condition may demand. Under all conditions too heavy or too many garments should be avoided. They should be made in such a way as to ensure easy washing, drying, and ironing. Unnecessary thicknesses of material, which are difficult to air well should be avoided.

No hard-and-fast rule can be made as to the number of garments required by an individual child. Very young, small, or feeble babies require warmer clothing than those who are larger and stronger. Coldness of hands and feet and blueness of lips would generally indicate need for more clothing. Overclothing, which should be guarded against in hot weather, may cause restlessness, fretfulness, and increased perspiration.

Bathing.

The daily bath is an "essential" for baby, and is necessary, not only for bodily cleanliness, but also for the health of the skin, which has important work to do in ridding the body of waste matter. If the pores become blocked the skin cannot act properly, and the health of the whole body suffers. If baby is feverish or ill, substitute warm sponging for the bath, but whether well or ill, baby's skin should be washed all over every day. Remember that a baby's skin is very delicate. Avoid using hard water or strong soap.

Exercise of Muscles.

In baby's earliest days, sucking and crying are his chief forms of exercise. Vigorous sucking is valuable exercise. It strengthens baby's jaws, and helps in the development of his teeth. If he is bottle-fed, see that the hole in the teat is not large enough to let the milk flow through in a stream so that he gets it without effort. In his own interests the bottle-fed baby should work just as hard to get the milk from the feeding bottle as he would have to do if fed by his mother.

Crying exercises and strengthens his lungs and improves the circulation in the whole body. For this reason a certain amount is healthy. The mother who picks her baby up each time he begins to cry is not only spoiling him but depriving him of healthy exercise. When baby is three months old he should be allowed to lie and kick, unhampered by clothing, for about half an hour, morning and afternoon. Protect him from draughts, clothe him loosely and unfasten his napkin so that his movements are quite free. In a very little while he greatly enjoys and looks forward to this daily exercise.

Training of Senses.

The skin is stimulated and the sense of touch trained by such things as the daily bath, exercise in the open air, handling, and comfortable clothing. Sight is trained by placing baby where he can watch people moving, see branches of trees waving, or other moving objects. Hearing develops early and is stimulated by ordinary daily sounds and by talking to the child, though mothers should not do too much of this. The sense of smell does not develop early. Taste is acute, even in very young babies.

Warmth.

The body temperature needs to be evenly maintained. In cold weather clothe baby so that all parts of the body are protected from chill. If the body is warm, pure cold air, day or night, will do no harm. In hot climates the aim must be to keep the child cool, but remember that young children chill quickly. Cold hands or feet can cause acute discomfort and prolonged crying.

Regularity of all Habits.

Regularity in baby's life should begin when he is born. In particular, there should be clock-like regularity of feeding, bathing, bowel action, sleeping, and exercise.

Cleanliness.

This does not mean baby's personal cleanliness only. The mother's hands and nipples should be regularly washed before the child is fed. If baby is "bottle-fed," much care and attention must be given to the food and all the appliances used, which must be scrupulously clean and protected from flies. Never leave dirty linen in baby's room. Remove soiled napkins immediately and place them in water. Always wash the hands thoroughly after handling napkins.

Mothering.

Proper handling is necessary for the best growth and development of baby. Infants who are allowed to lie passively all day in cots become pale and languid and do not thrive. Baby should not be nursed all the time he is awake. He grows and thrives better if left to kick and amuse himself. But do not leave him too long unnoticed, or in the same position. Speak to him in passing, turn him from side to side, or prop him up with pillows. A change of position is a relief and rest for baby, just as it is for older people, and it also gives him the attention which, among other things, means the mothering of the child. On the other hand, too much attention can do much harm. Do not constantly talk to or play with baby; it is tiring to his brain, and a strain on his nervous system. Too little attention may result in the child being listless and unhealthy; too much attention can upset his nervous system and turn him into a spoilt little tyrant.

Management.

This consists in carrying out daily and regularly all the essentials for the child. Do not feed him or give him a dummy because he cries. Teach him to understand that he cannot get his own way simply by crying for it. By your own example teach the child to have faith in you. Even to a baby never make a promise that you do not intend to keep.

Rest and Sleep.

These depend on the carrying out of the above essentials. If baby is fed, clothed, cared for and managed properly, he should sleep well. If he does not, look for the cause and try to remove it.

Newly-born infants should sleep about nine-tenths of their time; that is twenty-one hours out of twenty-four. At six months they should sleep about two-thirds of their time, that is about sixteen hours out of each twenty-four.

Mention was made in the previous article that the correct feeding of a baby ensured correct training in some other directions also. If baby is fed correctly and regularly, he is being trained to punctuality and regular habits. By giving him no night feeds from birth, he has the opportunity for the uninterrupted rest and sleep which is so necessary for him.

Attention during the first year to "Baby's Twelve Essentials," not only makes for his health and happiness during his first and subsequent years, but forms, on the right lines, the foundation of his character.

KITCHEN GARDEN.

Our notes for this month will not vary much from those for September. Sowings may be made of most vegetables. We would not, however, advise the sowing of cauliflowers, as the hot season fast approaching will have a bad effect on their flowering. French beans, including butter beans, may be sown in all parts of the State. Lima and Madagascar beans should also be sown. Sow the dwarf Lima beans in rows 3 feet apart with 18 inches between the plants. The kitchen garden should be deeply dug, and the soil reduced to a fine tilth. Give the plants plenty of room, both in sowing and transplanting, otherwise the plants will be drawn and worthless. Thin out melon and cucumber plants. Spraying for fungoid diseases should be attended to, particularly all members of the *Cucurbitaceæ* and *Solanum* families, of which melons and tomatoes are representative examples. Give plenty of water and mulch tomatoes planted out last month. Asparagus beds will require plentiful watering and a good top-dressing of short manure. See our instructions in "Market Gardening," obtainable on application to the Under Secretary, Department of Agriculture and Stock. Rosella seeds may be sown this month. No farm should be without rosellas. They are easily grown, they bear heavily, they make an excellent preserve, and are infinitely preferable to the mulberry for puddings. The bark supplies a splendid tough fibre for tying up plants. The fruit also makes a delicious wine.

FLOWER GARDEN.

The flower garden will now be showing the result of the care bestowed upon it during the past two months. The principal work to be done this month is the raking and stirring of the beds, staking, shading, and watering. Annuals may be sown as directed for last month. Plant tuberose, crinum, ismene, amaryllis, pancratium, hermocallis, hippeastrum, dahlias, &c. Water seedlings well after planting, and shade for a few days. Roses should now be in full bloom. Keep free from aphis, and cut off all spent flowers. Get the lawn-mower out and keep the grass down. Hoe the borders well, and trim the grass edges.

MARKET GARDENING.

Starting a Garden.

In selecting a site for a market garden there are four essential points to be considered—water, soil, aspect, and shelter. Another point to be remembered is that, in growing garden stuff for sale, there is also the question of convenience to rail and market to be taken into consideration.

To attain any degree of success in market gardening a good water supply is an absolute necessity. As a rule, the best situation for a garden is on the bank of a creek or near a lagoon or waterhole; but, if none of these is available, the alternative is to sink a well or make a dam, *for water you must have.*

There may be months and months during which no watering will be required, but it is quite certain that sooner or later a dry spell will come, often in August and September, when most vegetables should be vigorously growing, and if you have no supply you will probably lose the result of months of labour. Therefore, whether your garden consists of 20 acres or 20 perches, be certain that the water supply will keep it going at all seasons of the year.

The Soil.

You may rest assured that you cannot have too rich a soil for market gardening. But, at the same time, if a very rich soil be unobtainable, it is very easy to make it rich by a liberal and judicious use of manures; and it must be made so if you are to have success in growing cabbages and cauliflowers.

The deep alluvial flats commonly found near the banks of many of our creeks and rivers are ideal soils for this class of produce, being usually very rich in humus, resulting from decayed vegetable matter. Such a soil contains all the elements necessary to produce high-class vegetable crops. A light, sandy loam is better for such crops as onions, carrots, and plants of similar habit; but, as it is not always possible to get several kinds of soil within the limits of a garden, it follows that the soil must be made, as far as practicable, to suit each different crop by varying methods of treatment and manuring.

In locating the garden, it is well not to have it too far from the dwelling; in fact, if the house is *in* the garden, so much the better.

As to aspect, if the garden is on a slope, the fall should be to the east; but a level site is preferable, as level ground can be more easily and economically worked than a slope, and there is not the danger of both soil and crop being washed away during heavy rains, or of the valuable soluble portions of manure, where applied, leaching out, which effects are always to be feared in a garden located on a hillside. Then, if possible, the garden should be protected against heavy winds by a ridge or belt of timber.

In clearing scrub lands for a garden, it is advisable to leave a belt of trees standing on the side from which the prevailing winds blow. This belt should be 2 or 3 chains wide, and not sufficiently close to the garden to interfere with the free access of light and air to the plants.

Preparing the Land.

In preparing the land for gardening, deep working is recommended. Get down 15 in. or 18. if you can. If you use horse implements, break up the subsoil with a subsoil plough, but be careful not to bring the subsoil to the surface. The advantage of this deep working will be chiefly apparent in a long spell of dry weather, when plants in deep soil will be found to grow and thrive, while others in shallow soils will require constant care and watering to keep them alive. Should the ground be very level or wet in places, such parts should be drained either by means of surface drains or by one of the cheap methods of under-draining. The land being thoroughly broken up and brought to a fine tilth, the next step is to mark it off in sections for the various kinds of crops that you wish to grow.

If the garden is small and horses are not used, then a lesson may be learned from the Chinese gardeners, and that is, to make the beds of such a width as to obviate the necessity of trampling on them when weeding or transplanting. Very narrow pathways between the beds will suffice to give access to them, so that not much space is lost in this manner. But no hard-and-fast rule can be laid down. It is all a matter of convenience and circumstances, but always bear in mind that, even in a small garden, horse labour is cheaper than hand labour; therefore, arrange things in such a manner that as much of the work as possible may be done by means of horses.

Never sow garden crops of any kind *broadcast.* This is an obsolete custom, which, in view of the means now provided for sowing seeds by seed-saving implements, should have been done away with long ago.

This broadcasting of garden crops cannot be too strongly condemned, as it is wasteful, untidy, and unprofitable, except to the seed-sellers, who are the only people who benefit much by it.

Always sow in rows, and have the rows far enough apart to enable you to use either horse or hand cultivators between them. By following this system it is easy to keep the ground clean, and also to keep it open, and conserve the moisture by cultivation—a thing which cannot be done effectively where crops are sown broadcast.

A very simple hand seed-sower for small seeds may be made out of a tin, by boring a couple of small holes in the bottom sufficiently large to allow the exit of a seed. Fasten this to a wooden handle and shake as you go along the drill. There will be very little waste of seed.

Sowing the Seeds.

Cabbages, cauliflowers, and various other kinds are mostly raised in seed-beds; and it will be found better to sow all these in narrow shallow drills in the bed than to sow broadcast. Young plants grown in drills are much easier to lift and transplant than if broadcast, and as a rule are stronger and sturdier. In preparing the bed, the soil should be raked as finely as possible, and the seeds must not be sown too deeply. A quarter to a half inch of soil above the seed is usually enough. If the drills are covered in with a little, very fine, and thoroughly rotten manure, germination takes place quickly, and in transplanting, a ball of the manured soil will readily stick to the rootlets, which, not being unduly disturbed, thus affords the plants a greater chance of success.

In preparing soil for seed-sowing in the open ground, always have the soil thoroughly tilled, cleaned from weeds, and well pulverised. A harrow immediately following the plough will reduce most soil to a very fine tilth; and if not, the rake must be used to finish off, especially with such seeds as carrots and onions and plants of similar habit.

Excellent hand seed drills and hand cultivators are on the market, the latter being fitted at will with tines, sweeps, or miniature plough attachment. No market gardener can afford to do without an outfit of this description.

Where enough ground is available, all strong growing crops should be sown far enough apart to permit of a horse cultivator being used.

Transplanting.

For transplanting, the ground should be prepared, more especially for delicate plants, in precisely the same way as for seed-sowing. The finer the surface soil is, the more easily will be young tender rootlets be able to force their way down in search of food and sustenance; and as a consequence leaf growth will necessarily follow.

If the soil is hard and lumpy, the attempt of the rootlets to strike into it becomes to some extent useless, and it naturally follows that all growth is retarded, and the ultimate success of the vegetables is problematical. When taking the plants from the seed-bed, be careful not to break the roots too much, and endeavour to lift them with a little of the soil adhering. Never pull young plants up, but lift them carefully. It is a good plan to give the bed a thorough soaking with water some time before beginning to lift the plants.

Always, if possible, choose a dull or showery day for transplanting, but, should the weather be warm and dry, do the work in the afternoon, and water well after planting; and, if suitable material is procurable, mulch the ground for a few inches round each plant. Set the plants a little deeper in the ground than they were in the bed, and firm the soil well around the roots without bruising the necks of the plants.

Take care always to make the hole for planting just deep enough, so that the plant will not hang in it, and give the plants plenty of room to grow to their fullest possible size without crowding.

Should the weather be dry for some time after planting, it will be necessary to water the young plants several times a week until they become established; the watering being done either early in the morning or late in the afternoon. On unmulched land, the surface soil around the plants should be lightly stirred at intervals between the waterings to prevent crusting.

A great deal of watering and hoeing will, however, be saved if *mulch* is used as already advised. The importance of mulching cannot be overestimated. Almost anything will do—stable manure, grass, or litter of any kind, provided it can be easily and conveniently placed around the plants. Mulching prevents the ground from baking after watering, and so saves hoeing; and it also helps to arrest evaporation and economises water; it tends also to keep the temperature of the surface soil equable and promotes a healthy and vigorous root action. Protection of this character is invaluable. Systematic mulching is confidently recommended for all classes of garden crops which require to be transplanted, and the grower who follows this practice, is assured of a greater degree of success in all operations.

Shading Seedlings.

The object of shading newly planted-out seedlings is not to entirely exclude the sun's rays, but to break them up, so that the great heat and light may be gently distributed, until the young plants resume their natural functions and activities.

(*To be continued.*)

COUNTRY WOMEN AT WORK.

IMPROVING RURAL LIFE.

> "Keep us, O Lord, from pettiness—let us be large in thought and word and deed.
>
> "Let us be done with fault-finding, and leave off self-seeking.
>
> "May we put off all pretence, and meet each other face to face without self-pity, and without prejudice.
>
> "May we never be hasty in judgment, and always generous.
>
> "Teach us to put into action our better impulses straightforward and unafraid.
>
> "Let us take time for all things—make us grow calm, serene, and gentle.
>
> "Grant us that we may realise that it is little things that create differences—that in the big things of life we are one.
>
> "And may we strive to touch and know the great woman's heart common to us all, and, O Lord, let us not forget to be kind."
>
> —*Marie Stuart.*

With such thoughts to guide them it is not difficult to understand the very real success of the National Federation of Women's Institutes in England and Wales, and the reason why the institutes should now number 4,400 with a membership of 267,000.

The main purpose of women's institutes is to improve and develop conditions of rural life by providing centres for educational activities and social intercourse. The Country Women's Association in Australia has exactly the same desire, and though the way in which the institutes work to achieve this end differs so greatly to that of the branches of the Country Women's Association, this is only so because of the entirely different conditions under which country people live in England and Australia. The desire of both the Women's Institutes in England and the Country Women's Association in Australia is that each organisation shall retain its simplicity in spite of the power given it by an ever-increasing membership; both organisations wish to concentrate on simple things which directly affect country people.

As the branches of the Country Women's Association set out to gather the women in their districts, and work together to make conditions of life better for the women and children of the community, so the members of the institutes in England meet each month. The institute meetings are made very interesting by lectures and demonstrations on almost every subject one can think of, such as household jobbing, soft toy making, all kinds of cooking and preserving, poultry keeping, gardening, pruning, furniture re-covering, all kinds of handicrafts. Competitions of original thought cause much interest and fun. In one case after a talk on the potato, its history and culture, each member received a potato to set for a competition. Hundreds of dozens of eggs are collected each year by members, and are given to hospitals, children's homes, and similar institutions.

Exhibitions of women's work of every description, debates, concerts, and plays keep the interest in the meetings very keen. The international spirit of the members is very evident, and they take an active interest in the work of women of other countries. As a body the work of the institutes in providing opportunities for educational activity, assisting in securing good nursing services, more maternity and child welfare centres, and generally safeguarding the health and happiness of country people is really very wonderful.

From the work of the institutes it is seen that money-raising enters very little into its objectives; friendliness between women of all classes and creeds and the providing of interesting subjects for thought and entertainment for women in rural districts means very much more to them.

The thirteenth annual general meeting of the National Federaton of Women's Institutes was held in London at the beginning of May, and was attended by 2,700 delegates from all over England and Wales, as well as visitors from other countries.

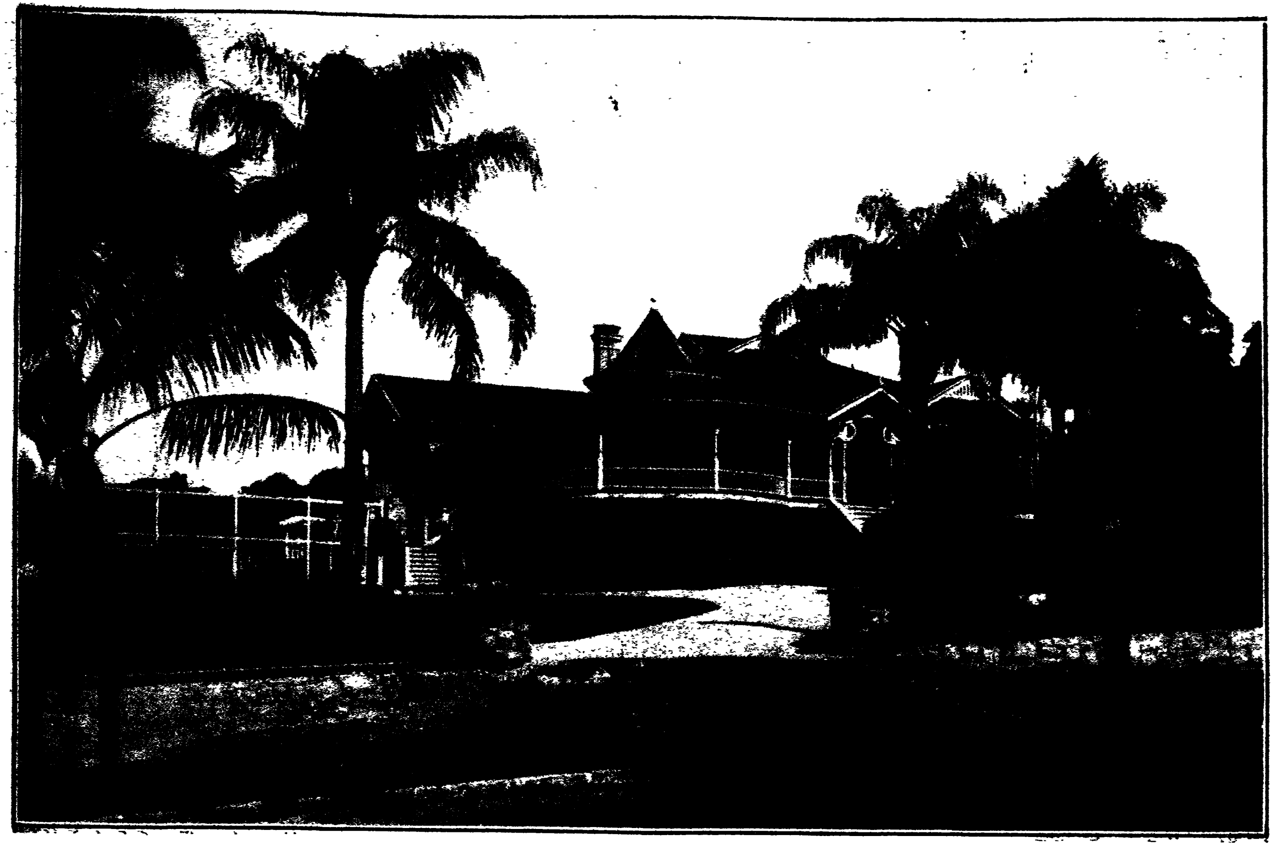

PLATE 126.—A QUEENSLAND HOME AND GARDEN.

Mrs. Hubert Fairfax, of Queensland, attended this meeting as representative of the Country Women's Associations of the States of Australia, and was warmly welcomed. Lady Denman, chairwoman of the National Federation of Women's Institutes, addressed the delegates and said: ". . . . It must be very satisfactory to all of us to think that not only in our own country, but all over the world, country women are banding themselves together to add to their own happiness and to help on new ideas and to carry them into effect. In the past country women in most parts of the world have accepted the conditions of their lives and have had no power to alter them. They were not united in any organisation, and had no means of considering the questions which affect them and of making their wishes known. Thirty years ago Canadian women formed the first women's institute. Their lead has been followed in this country, and the movement is spreading throughout the British Empire. Simultaneously associations of country women have been growing in Europe and in the United States of America. I think it is very satisfactory to realise that now in most parts of the world groups of country women need no longer lead lives of utter loneliness. They can form an institute; they can meet and make friends; they can enjoy acting, dancing, and singing; they can study the past and consider the present questions of the day; they can take their share in promoting the good of their countries and the peace of the world."

FARM HOMES.

MAKING THEM BEAUTIFUL.

Beautiful home grounds are the first essential to a beautiful State. No matter how attractive the grounds around public buildings, or how well cared for the borders of our highways, or how numerous and fine the natural beauties of the State, if our home grounds are slovenly and unattractive, then we cannot boast of a beautiful State.

Our slogan should be, "All home grounds, attractive home grounds." Do I hear some one say, "Impossible or impractical?" Not so! It is only impossible or impractical when there is no desire for attractive surroundings or lack of initiative or ingenuity in making them attractive. Too expensive! No, not necessarily, for a little labour and the seeds of a few annual flowers to be had for a few pence can often change a repulsive yard into a place which will attract attention and elicit favourable comment. Let us no longer look for lame excuses as a reason for not doing something which we know needs doing and which richly rewards him who brings about the transformation and gives pleasure to his neighbour and to the passers-by.

Fencing and Planting.

An attractive home ground must have the appearance of being well cared for. Nothing detracts more from a place than to have the yard littered with objects which do not belong there. This applies to the grounds in the rear of the house as well as to those in front. If it becomes necessary to store machinery or carry on certain operations between the house and barn, divide the space into two distinct areas and by proper fencing and planting hide the features which would detract from the beauty of home grounds. Twenty-five years ago one would scarcely see in a day's travel a farm home ground which was mowed with a lawn mower. But the farmer appreciates neat appearances as much as his city cousin, and as a result the lawn mower is rapidly becoming standard equipment on the farm. A hay field is attractive, but not when it surrounds the farm home. Mowing of the lawn is necessary, and the lawn mower is the best implement for that purpose. While other methods may be used for keeping the grass under control none of them produce as good a lawn or as satisfactory an appearance as the lawn mower.

Part of the Picture.

Make the house appear as a part of the picture you are painting with grass, shrubs, flowers, and buildings. To do this you must give the house a setting. Trees are valuable for this purpose. Tall trees at the rear of the house and at the sides at some little distance from the house are very desirable. They may not look like much soon after planting, but in years to come they will form a background and frame for the house which will enhance its attractiveness manifold. Trees may also be used along the highway, and if the lawn is fairly large, as individual specimens on the lawn, or if very large, possibly in small clumps. Stick largely to the native trees, particularly the more permanent kinds, and never plant them in rows except along the drive.—J. J. MOORE, in "Hoard's Dairyman."

Orchard Notes for October.

THE COASTAL DISTRICTS.

October is frequently a dry month over the greater part of Queensland, consequently the advice that has been given in the notes for August and September regarding the necessity of thorough cultivation to retain moisture is again emphasised. Unless there is an adequate supply of moisture in the soil to meet the trees' requirements, the coming season's crop will be jeopardised, as the young fruit will fail to set.

Thorough cultivation of all orchards, vineyards, and plantations is therefore imperative if the weather is dry, as the soil must be kept in a state of perfect tilth, and no weeds of any kind must be allowed to grow, as they only act as pumps to draw out the moisture from the soil that is required by the trees or fruit-yielding plants. Should the trees show the slightest sign of the want of moisture, they should be given a thorough irrigation if there is any available means of doing so, as it is unwise to allow any fruit trees to suffer for want of water if there is a possibility of their being supplied. Intermittent growth, resulting from the tree or plant being well supplied with moisture at one time and starved at another, results in serious damage, as the vitality is lessened and the tree or plant is not so well able to ward off disease. A strong, healthy, vigorous tree is frequently able to resist disease, whereas when it has become debilitated through neglect, lack of moisture or plant food, it becomes an easy prey to many pests. If an irrigation is given, see that it is a good one and that the ground is soaked; a mere surface watering is often more or less injurious, as it is apt to encourage a false growth which will not last, and also to bring the feeding roots to the surface, where they are not required, as they only die out with a dry spell and are in the way of cultivation. Irrigation should always be followed by cultivation, so as prevent surface evaporation and thus retain the moisture in the soil.

All newly planted trees should be carefully attended to, and if they show the slightest sign of scale insects or other pests they should receive attention at once. All growth not necessary to form the future tree should be removed, such as any growths on the main stem or main branches that are not required, as if this is done now it will now only save work later on, but will tend to throw the whole strength of the tree into the production of those limbs that will form the permanent framework of the tree. In older trees all water sprouts or other similar unnecessary growths should be removed.

Keep a good lookout for scales hatching out, and treat them before they have become firmly established and are coated with their protective covering, as they are very easily killed in their early stages, and consequently much weaker sprays can be used. The best remedies to use for young scales hatching out are those that kill the insects by coming in contact with them, such as miscible oils, which can be applied at a strength of 1 part of oil in 40 parts of spraying material and will do more good than a winter spray of double the strength. In the use of miscible oils or kerosene emulsion, always follow the directions given for the use of these spraying materials, and never apply them to evergreen trees when they are showing signs of distress resulting from a lack of moisture in the soil, as they are then likely to injure the tree, whereas if the tree is in vigorous growth they will do no harm whatever.

All leaf-eating insects should be kept in check by the use of an arsenate of lead spray, taking care to apply it as soon as the damage appears, and not to wait till the crop is ruined. Crops, such as all kinds of cucurbitious plants, tomatoes, and potatoes are often seriously injured by these insects, and the loss occasioned thereby can be prevented by spraying in time. In the case of tomatoes and potatoes, a combined spray of Bordeaux or Burgundy mixture and arsenate of lead should be used, as it will serve the dual purpose of destroying leaf-eating insects and of protecting the plants from the attack of Irish blight.

Grape vines require careful attention, and, if not already sprayed with Bordeaux mixture, no time should be lost in applying this material, as the only reliable method of checking such disease as anthracnose or black spot and downy mildew is to protect the wood and foliage from the attack of these diseases by providing a spray covering that will destroy any spores that may come in contact with them. The planting of bananas and pineapples can be continued during this month. See that the land is properly prepared and that good healthy suckers only are used. Keep the plantations well worked, and allow no weed growth. Keep a very careful lookout for fruit flies; destroy every mature insect you can, and gather and destroy every fallen fruit. If this is done systematically by all growers early in the season the subsequent crop of flies will be very materially decreased. See that all fruit sent to market during the month is carefully handled, properly graded, and well packed—not topped, but that the sample right through the case or lot is the same as that of the exposed surface.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Much of the matter contained under the heading of "The Coastal Districts" applies equally to these parts of the State, for on the spring treatment that the orchard and vineyard receives the succeeding crop of fruit is very largely dependent. All orchards and vineyards must be kept in a state of perfect tilth, and no weed growth of any kind should be allowed. In the Western districts, irrigation should be given whenever necessary, but growers should not depend on irrigation alone, but should combine it with the thorough cultivation of the land so as to form and keep a fine soil mulch that will prevent surface evaporation.

All newly planted trees should be carefully looked after and only permitted to grow the branches required to form the future tree. All others should be removed as soon as they make their appearance. If there is any sign of woolly aphis, peach aphis, or scale insects, or of any fungus diseases on the young trees, these diseases should be dealt with at once by the use of such remedies as black leaf forty, Bordeaux mixture, or a weak oil emulsion. In older trees, similar pests should be systematically fought, as if kept in check at the beginning of the season the crop of fruit will not suffer to any appreciable extent. Where brown rot has been present in previous years, two or more sprayings with Bordeaux mixture can be tried, as they will tend to check other fungus growths, but at the same time the sodium or potassium sulphide sprays are more effectual for this particular disease and should be used in preference when the fruit s nearly full grown. All pear, apple, and quince trees should be sprayed with arsenate of lead—first when the blossom is falling, and at intervals of about three weeks. Spraying for codlin moth is compulsory in the fruit district of Stanthorpe, and wherever pomaceous fruit are grown it must be attended to if this insect is to be kept in check.

In the warmer parts a careful check should be kept for any appearance of the fruit fly, and, should it be found, every effort should be made to trap the mature insect and to gather and destroy any affected fruit. If this is done, there is a good chance of saving the earlier ripening summer fruits, if not the bulk of the crop. Tomato and potato crops will require spraying with Bordeaux mixture, as also will grape vines. Keep a very strict watch on all grape vines, and, if they have not already been treated, don't delay a day in spraying if any sign of an oil spot, the first indication of downy mildew, appears on the top surface of the leaf. Spraying with Bordeaux mixture at once, and following the first spraying up with subsequent sprayings, if necessary, will save the crop, but if this is not done and the season is favourable for the development of the particular fungus causing this disease, growers can rest assured that their grape crop won't take long to harvest.

Where new vineyards have been planted, spraying is also very necessary, as if this is not done the young leaves and growth are apt to be so badly affected that the plant dies.

Farm Notes for October.

FIELD.—With the advent of warmer weather and the consequent increase in the soil temperature, weeds will make great headway if not checked; therefore our advice for last month holds good with even greater force for the coming month. Earth up any crops which may require it, and keep the soil loose among them. Sow maize, cowpeas, sorghums, millet, panicums, pumpkins, melons, cucumbers, marrows. Plant sweet potatoes, yams, peanuts, arrowroot, turmeric, chicory, and ginger. Coffee plants may be planted out. There are voluminous articles in previous journals giving full instructions how to manage coffee plants, from preparing the ground to harvesting the crop, to which our readers are referred.

DEPARTMENTAL PUBLICATIONS.

AVAILABLE FOR DISTRIBUTION.

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Catalogue of Queensland Plants. Price 15s.
Chemistry for the Farm, Dairy, and Household (Elementary). Price, 2s. 6d.
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BULLETINS.

Economic Dairy Bulletins, 1D, 2D, and 3D.
Economic Sugar Bulletin, 5SC.
Economic Cotton Bulletin, 4C.
Pig Raising Bulletin, 6P.
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J. F. F. REID,
Editor of Publications, Department of Agriculture and Stock.

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ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

MOONRISE.

	September, 1929.		October, 1929.		Sept., 1929.	Oct., 1929.
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
					a.m.	a.m.
1	6.9	5.35	5.35	5.49	4.25	4.32
2	6.9	5.36	5.34	5 49	5.15	5.6
3	6.8	5.36	5.33	5.50	5.59	5.39
4	6.7	5.37	5.31	5.51	6 36	6.11
5	6.6	5.37	5 30	5 52	7.9	6.43
6	6.5	5 38	5.29	5 52	7.44	7.16
7	6.5	5.39	5.27	5.53	8.15	7.52
8	6.4	5.40	5 26	5.54	8.46	8.36
9	6.3	5.40	5.25	5.54	9.22	9 27
10	6 2	5.40	5.24	5 55	10 1	10.13
11	6.0	5.41	5.23	5.55	10.43	11.6
12	5.59	5.41	5.22	5.56	11.32	11.59
						p.m.
13	5.58	5.41	5.21	5 56	12.23	12.55
14	5.56	5.42	5.20	5.57	1.15	1.52
15	5.54	5.42	5.19	5.57	2.10	2.50
16	5.52	5.42	5.18	5.58	3.8	3 47
17	5.51	5.43	5.17	5.58	4.6	4.45
18	5 50	5.43	5.16	5.59	5.3	5.45
19	5.49	5.44	5.15	5.59	6.1	6.47
20	5.48	5.44	5.14	6.0	6.57	7.52
21	5.47	5.45	5.13	6.0	7.56	9.2
22	5.46	5.45	5.12	6.1	8.59	10.8
23	5.45	5.46	5.10	6.1	10.3	11.13
24	5.43	5.46	5.10	6.2	11.9	...
						a.m.
25	5.42	5.47	5.9	6.3	...	12.14
					a.m.	
26	5.40	5.47	5.8	6 3	12.16	1.8
27	5.39	5 48	5.8	6.4	1.18	1.54
28	5.38	5.48	5.7	6.5	2.17	2.33
29	5.37	5.49	5.6	6.5	3.10	3.7
30	5.35	5.49	5.6	6.6	3.54	3.39
31			5.5	6.7		4.10

Phases of the Moon, Occultations, &c.

3 Sept.	●	New Moon	9 47 p.m.
11 ,,	☾	First Quarter	8 47 a.m.
19 ,,	○	Full Moon	9 16 a.m.
26 ,,	☽	Last Quarter	12 7 a.m.

Apogee, 13th Sept., at 5·18 a.m.
Perigee, 28th Sept., at 10.42 a.m.

The Moon will be passing from west to east of Jupiter on the 25th, at 9 a.m. They will then be well above the western horizon, a good deal (22 degrees) northward and it may be possible to detect Jupiter in the day time as its brightness has been increasing since March. A pair of binoculars will easily bring Jupiter into view in spite of the bright sunlight in the eastern side of the sky.

The apparent nearness of Venus and Neptune, especially on the 27th, will be less than the diameter of the Moon. The real distance between them will, however, amount to about 2,800 millions of miles. For ordinary observers the occasion is not exactly favourable, the planets being near the eastern horizon a short time before sunrise.

The Southern Cross will be on its side, like III on the clock-face about 8 p.m. on the 1st and about 6 p.m. on the 30th. It will be disappearing a few degrees west of south about 11 p.m. on the 1st and about 9 p.m. on the 30th. Aquarius will be rising at sunset on the 1st and Pisces on the 30th. The Great Square of Pegasus will be in the north-east at 8·30 p.m. in the middle of the month. The planets Venus and Jupiter which were, apparently, so near to one another in July, will be widely separated in September by a distance of over 100 degrees.

3 Oct.	●	New Moon	8 19 a.m.
11 ,,	☾	First Quarter	4 5 a.m.
18 ,,	○	Full Moon	10 5 p.m.
25 ,,	☽	Last Quarter	6 21 p.m.

Apogee, 11th October, at 12.42 a.m.
Perigee, 23rd October, at 8.0 a.m.

On the 5th Jupiter will appear to have reached its farthest eastern position in Taurus, about 7½ degrees beyond Aldebaran. It will then, apparently, be retracing its path westwards towards Aldebaran, which it will pass about 4½ degrees to the northward on 17th October.

Mercury will be passing from the east to the west side of the Sun on the 8th. On this occasion it will avoid a transit across the Sun's face by passing on the south side of the Sun, about three times the diameter of the Moon from it. Mercury will, therefore, be invisible until after the 15th, as it will rise an hour before the Sun only near the end of the month.

The proximity of Saturn to the Moon, as they rise together on the 9th, about half-past 9 in the morning, will be observable only with telescope or binoculars.

When the Moon rises, about 10 p.m. on the 22nd, Jupiter will be seen to be 4 degrees to the southwest of its darker edge.

On the 23rd, Mercury will reach its greatest distance, 18 degrees on the west side of the Sun, and will rise about one hour before the latter.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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QUEENSLAND AGRICULTURAL JOURNAL

VOL. XXXII. 1 OCTOBER, 1929. PART 4.

Event and Comment.

The Utilisation of Sugar By-Products.

ONE of the most useful debates in the current Parliamentary session was the recent discussion on the profitable utilisation of all the products of sugar-cane, initiated by Mr. Swayne, the member for Mirani. Good service was done for our main agricultural industry by stimulating public interest in its economic possibilities other than the manufacture of sugar. At the Plane Creek Mill may be seen samples of building board made out of megass, and other commercial commodities, and its management is very keen on exploring the further possibilities of the industry and has collected a fund of information on the subject. As a base for stock food in which molasses and maize are prime ingredients the utility of dessicated megass has long been known, and it is claimed that a nutritious concentrated ration can be marketed at quite a reasonable price. Mr. Snowden's recent announcement in the House of Commons influenced Mr. Swayne in bringing the matter forward and his utterance was a timely one, for the British Chancellor in making clear his intention of removing all food duties mentioned sugar specifically, and with the removal of those duties all preferences must naturally go with them. As everybody already knows, if that intention is carried out it will affect very seriously all Dominion-grown sugar. Anticipating the situation likely to arise as a consequence, Parliament was asked to consider other ways in which the sugar industry may be safeguarded, and commercial utilisation of its other products offers some solution of the serious difficulty with which it may be faced. We have exported, since 1924, sugar to the value of £9,700,000, so it can be realised what the loss of that amount, or perhaps more, in the next five years would mean to the industry in this State and which even now is not as prosperous as many people seem to think. That nine or ten millions sterling as a factor in our trade balance cannot be ignored either. Taking the long view we must consider every possible means of, if not improving, at least preserving the present conditions in the industry. Industrial alcohol, building board, and stock food—each of which has already been demonstrated commercially—provide at least three commodities on which attention might be concentrated to a much greater degree. The commercial possibilities of each are patent, and it is due to our own spirit of enterprise to explore those possibilities to the limit. Take motor spirit—Australia requires something like 200,000,000 gallons every year, and, if locally produced power alcohol can be diluted with it to the extent of 15 per cent., which is said to be the practicable limit, that would bring large quantities of molasses into industrial use. To convert it into power alcohol we would need at least thirty distilleries of the capacity of the present plant at Sarina. Our present output of molasses is, however, 17,000,000 gallons, of which nearly half is already required by distillers or for stock food. The rest, with the exception of about 3,000,000 gallons which is allowed to run to waste, is put to other more or less economic uses, such as for fuel and fertiliser. The questions raised by Mr. Swayne are: Can we utilise profitably more cane products for the production of motor spirit? Is it possible to profitably treat for the same purpose the sugar which we now export? It is all a matter of the same old thing, the cost of production, and that is obviously a subject for chemical and economical inquiry. The outstanding present facts are that from sugar products we can make commercially power alcohol, building board, and nutritious stock foods, and they at least constitute a basis for further research and possibly more profitable exploitation.

Field Efficiency in Queensland.

AMONG recent visitors to Queensland was Mr. L. D. Larsen, of Kileneua Sugar Plantation, Hawaii. He has been making a general survey of the industry in the course of a four months' tour which took in Formosa, the Philippines and Java, and Queensland. His visit to Queensland he declared to be the most profitable, particularly on the economic side. Here the cost of production had made it necessary to use modern machinery and all sorts of labour-saving devices. The points in labour economy that impressed him most were the general practice of machine planting; the development of new and original cultivation; the use of machines for applying fertilisers; the development of machines for weeding in the cane row; and harvesting machines. He complimented Queensland canegrowers on their progressiveness and originality along those lines. Two of the implements he saw—the roto-cultivator and spinwheel-weeder—he regarded as distinctly original types. The cane-planter, a Queensland product, he said was decidedly simpler and more efficient than the machine occasionally used in Hawaii. Mr. Larsen also paid a high compliment to the Queensland canecutter and other field hands, who impressed him strongly as possessing a high degree of intelligence and interest in their job and the sugar industry as a whole.

He added—"Conditions in Queensland are unique in the sugar world on account of the high wages paid for field labour, and the use of white labour. However, I believe the situation is being met intelligently by employers as well as employees. I did not find the tendency on the part of labour to shirk and hold back the job that is evidenced in some other highly-organised labour communities. I studied men employed at task labour and at day labour, and believe their application and efficiency is decidedly superior to that of our labour in Hawaii or the other sugar countries visited. The relations between the plantation manager and his employees seemed decidedly pleasant in the cases I had opportunity to notice, and I believe the plantation managers are to be commended for the way they have met and adapted themselves to conditions of labour and to Government regulations that at best must be arduous and irritating. Impossible as these conditions seem to one accustomed to the use of coloured labour, they are taken in Queensland as part of the business, much as we in other countries look upon taxes and unfavourable weather."

The Call of the North.

EVERY year there is a steady increase in the number of Southern visitors who follow the sun to the North and enjoy the geniality of Queensland's wonderful winter. One direct advantage to the sugar industry of their coming is that they are able to get personal impressions of its economic and social value to the Commonwealth. This winter many more distinguished people than usual joined in the annual migration, and it so happened that their advent synchronised with one of the periodical revivals of the Southern agitation against the sugar embargo. It is all to the good that they shall on their return—and there is already evidence that they will not remain silent on the subject—help to remove many of the misconceptions of the industry that cloud the minds of members of the Victorian Housewives' Association and other busy people below the Border and beyond the Murray. There is some truth in the suggestion of one visiting Federal Parliamentarian that more propaganda is necessary, especially among the consumers on the basic wage who are naturally susceptible to the publicity of opposing interests, and to whom the facts of the industry are not always adequately presented, if at all. The Town and Country Union of Victoria, which is apparently an association of uncompromising fiscal ''wee-frees,'' is the latest body to enter the lists in the appeal to Southern prejudice, and though their efforts towards the removal of the embargo have been countered by the prompt answer of the Premier, Mr. Moore, their activities show the necessity of continual and ever-increasing vigilance on the part of cane-growing organisations and others concerned, and of constant and appropriate propaganda. Fortunately, the tourist attractions of North Queensland are bringing every year more people who count in legislative and commercial circles in the South, and their knowledge of the industry gained on the spot will add to their favourable influence in places where it is most needed.

Empire Sugar.

PREFACING a recent report on the sugar position, the Chairman of the Empire Sugar Federation, Sir Benjamin Morgan, made a strong appeal for more consideration of the production of the Dominions and Colonies, which used principally British machinery and supplies of every description. The report shows that in 1928 Great Britain imported 215,323 tons of refined sugar from foreign countries and only 6,424 tons from Empire sources. The imports of unrefined sugar from foreign sources in that year amounted to 1,153,861 tons, as compared with 556,313 tons from British countries. Australia is already the largest producing unit in the British Empire with the exception of India, which is out of the reckoning as a supplier of the British market. The report states that Britain's position as a large buyer of sugar, and her almost solitary tendency to bow down to the doctrines of free import, has made her at once the object of hope to heavily protected foreign countries, and of anxiety to her own natural suppliers. Some realisation of the need to ensure an Empire supply of sugar, and thus to escape the very imminent danger of permanent high prices which foreign domination of the market would make inevitable, impelled the tentative preferences in the Budget of 1920, which have since been stabilised at a money value. It is now of the highest importance for the guaranteeing of supplies that the preference should be extended on a more ample scale. The Empire countries producing sugar may roughly be divided into three: the Dominions (Australia and South Africa), where the protected home market is satisfied before export; the dependent Colonies, where the whole of the production is exported; and India, the inadequate producer of less than 3,000,000 tons of inferior sugar and still an importer of the product of a plant indigenous within her borders. Leaving India necessarily aside, Britain must depend for her supplies on the Dominion and Colonial groups, and it is essential that there should be, between these three, entire agreement as to the policy which can best promote and increase production for the needs of this market.

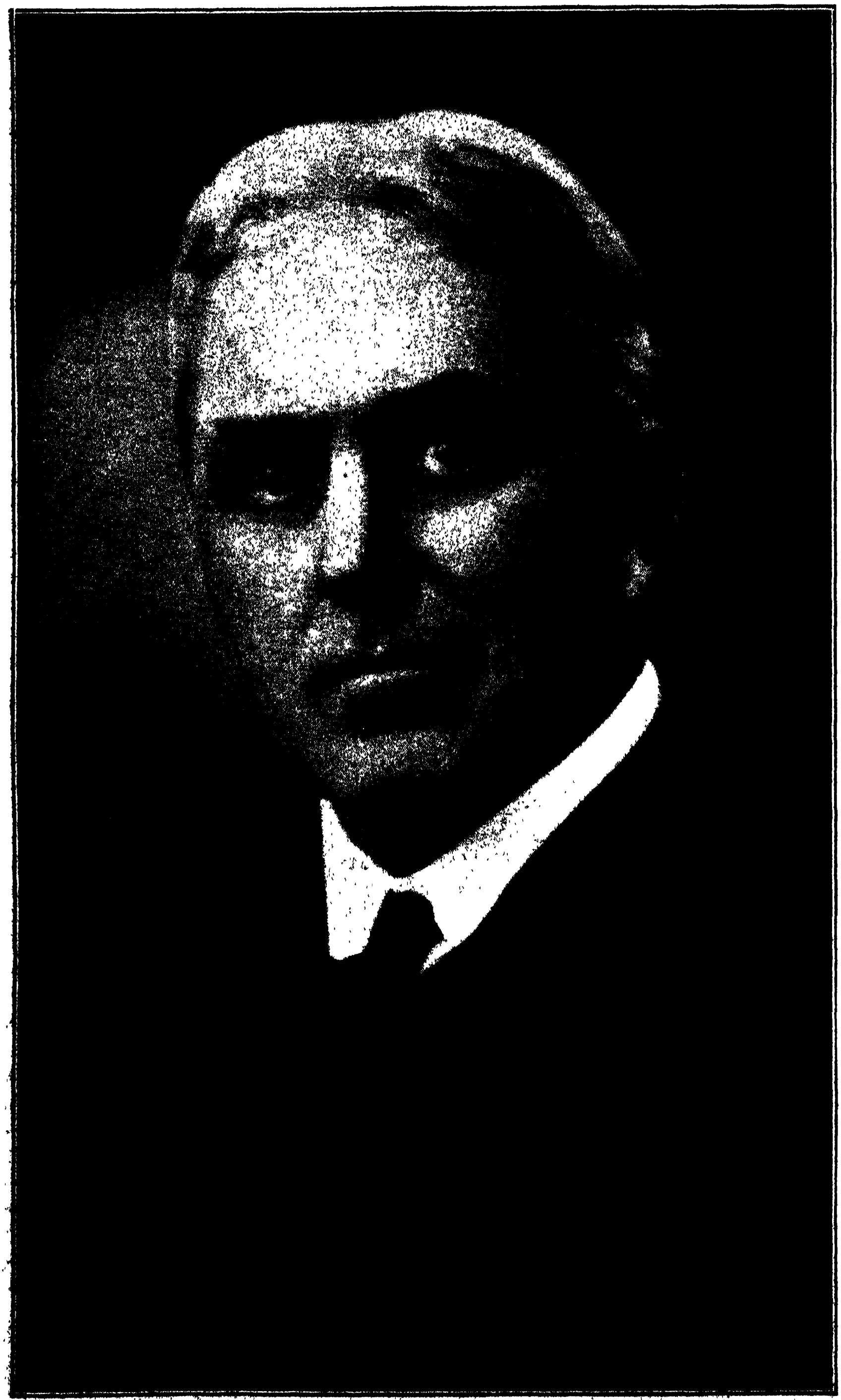

Plate 127.—The Hon. Arthur E. Moore,
Premier of Queensland and a Noted Agriculturist.

Bureau of Sugar Experiment Stations.

CANE PEST COMBAT AND CONTROL.

The Director of the Bureau of Sugar Experiment Stations has received from Mr. Edmund Jarvis, Entomologist, at Meringa, near Cairns, the following report for the period of August to September, 1929:—

Effect of Low Temperatures on Parasitic Insects.

Certain insects are able to resist excessive cold or heat better than others, although many species are killed when the thermometer registers several degrees below freezing point. The activities, for instance, of some species of locusts (grasshoppers) are greatly influenced by changes of temperature, such insects becoming practically dormant under conditions varying from 25 to 40 deg. Fahr., and succumbing to an exposure lasting about twelve hours to 17 deg. Fahr.

An exposure of only about ten minutes to a temperature of 130 deg. Fahr. has been proved to be equally fatal to grasshoppers, while, on the other hand, the greatest degree of activity in such orthopterous insects occurs between temperatures of 70 deg. and 100 deg. Fahr.

High Temperatures Prove Fatal to Cane Beetles.

Our greyback cockchafer (*Lepidoderma albohirtum* Waterh.) is unable to survive maximum shade temperatures of 95 to 98 deg. Fahr., when such conditions chance to last for about thirty-six hours and are accompanied by a warm land breeze. Although resting by day in their feeding trees in a more or less shaded situation, these beetles, after enduring such heat for a few hours, become strangely agitated, and after vain endeavours to obtain cooler situations by congregating on the shady side of large tree trunks soon release their hold of the bark and tumble helplessly to the ground before expiring.

Reverting again to the effect of cold on species of the class Insecta, an interesting instance of this occurred at our Experiment Station at Meringa on 12th September in connection with the breeding of Tachinid flies, when the temperature registered by our outside minimum thermometer was found to be 38 deg. Fahr. It so happened that a consignment of these parasites was wanted that morning for an Innisfail grower, but at 7.30 a.m., when they should have been collected for transmission on the early train, nearly all of the specimens were seen lying motionless on the floorboards of the breeding cage. Most of the flies were on their backs, and although some were just able to feebly move a leg or two, others appeared upon first inspection to be dead. Such, however, was not the case, as when some of these latter were transferred to a warm place they soon made a complete recovery and became strong enough to take to wing as usual. By 10.30 a.m. (three hours later), after the sun had warmed the air somewhat, the majority of specimens were resting on the sides of the cage or on cane sticks. At 3 p.m. of the same day only four of these parasites could be found on the floor, two of them (males) being dead, while the other two appeared to be dying.

Judging by past weather records, the occurrence of 38 deg. Fahr. at about the middle of September is very unusual.

In 1923 and 1925, however, the lowest shade minimum temperature for that month was 37 deg. Fahr., while during 1925 the lowest shade minimum temperature for the four months (1st June to 30th September) was only 41.75 deg. Fahr., and the mean shade minimum 50 deg. Fahr.

In this connection it will be of interest to briefly consider the effect likely to be produced upon the economy of the Tachinid *Ceromasia sphenophori*, which at present is breeding in our canefields, this being a point that has not, so far as I am aware, been raised before. Under caged conditions such dipterous parasites were benumbed in the manner described above have only themselves to look to, but in the event of their being rendered helpless in this way and obliged to lie fully exposed upon the surface soil between cane rows they would certainly run a great risk of falling an easy prey to ants and other predaceous enemies.

In all probability, however, these parasitic flies ,when living under natural field conditions, might be able instinctively to sense the approach of exceptionally cold nights and accordingly seek to take advantage of well-sheltered places behind dry leaf-sheaths situated near the basal portions of cane sticks, where they would not have to face a chilling wind and would be afforded a chance of keeping away from the bare ground or exposed situations.

Outbreak of "Army Worm" Caterpillars.

Early this month (September) an urgent 'phone message was received from the Tully district calling attention to an outbreak of *Cirphis unipuncta* Haw. on a plantation situated about two miles north of the mill. Prompt attention was accordingly taken to combat the ravages of this pest, and Mr. W. A. McDougall, who was sent to carry out this work, reported briefly as follows:—"The cane damaged is a mixture of first and second ratoon Badila. The caterpillars commenced operations near the scrub side of the farm, on the land, and advanced towards the higher land near the road. On Monday—*i.e.*, after a fortnight's feeding—the midribs only of about two and a-half acres of second ratoon were left. A band (just in front of attack) 5 to 8 yards wide across 200 to 250 yards was sprayed with lead arsenate."

During the five evenings preceding the day on which this spraying was done the owner had collected about half a kerosene tin full of caterpillars.

The strength of sprays used against various leaf-eating caterpillars and beetles is generally about 2 lb. in 50 gallons of water; but when considered necessary as much as 3 lb. of the arsenate can be safely employed to the 50 gallons without risk of injuring the leaves.

In the present instance ½ lb. lead arsenate in 9 gallons of water was found sufficient to do the work required.

The spray pump used was a Knapsack Auto Spray No. 1, of 3 gallons capacity, 12 feet high by 7 inches diameter, weighing about 7 lb., and costing approximately £3 15s.

This pump is constructed of brass, which will not corrode with strong solutions, and will last indefinitely, and is designed to discharge the spraying material under high compression. Particulars as to where these spray pumps can be obtained will be furnished on application to the Meringa Station or the Bureau of Sugar Experiment Stations, Brisbane.

The following extracts have been taken from a report (3rd September, 1929) to the Director of Sugar Experiment Stations (Mr. H. T. Easterby) by Mr. Edmund Jarvis, Entomologist at Meringa, for the period July to August.

The Grub Problem.

By the beginning of August portions of the cane areas in the Mulgrave and Highleigh districts, which were believed to have escaped grub injury, had suddenly shown unmistakable evidence of attack. Several such cases were noticed by the Mulgrave Cane Inspector, Mr. M. J. Hoare, who attributes these belated signs of infestation to the occurrence of unusually favourable weather during June and July, which, he thinks, has enabled grub-affected stools to make enough additional root growth to keep the leaves from yellowing.

Outlook for Next Season.

Without wishing to be unduly optimistic, it may be of interest to state that conditions up to the present point to a possibility of our grub pest receiving a climatological check next season. Such good fortune would certainly be very welcome in view of the chances that in the event of August to October proving favourable to the pupal and early beetle conditions in the soil, we may expect a more general and serious outbreak of this cane pest than that experienced last season (1928-29).

The Present Position.

During the past few years I have not seen any reason to alter the opinion given in my annual report for 1924-25, regarding the most effective means of controlling the grubs of our "greyback" cockchafer (*Lepidoderma albohirtum* Waterh.).

After fifteen years of experience and considerable experimentation against the various life-cycle stages of this beetle, it appears that fumigation of grub-infested soil offers the best chance of ultimate control. At the same time we should not forget that the winged or beetle condition presents important possibilities in this direction; since, by collecting, trapping, or otherwise destroying these cockchafers through the fortnight preceding oviposition, it is possible to prevent deposition of the eggs.

The most promising of such remedial methods is probably that of luring great quantities of the beetles into suitable traps by the use of attractive aromas (see Bulletins Nos. 17, 18, 19, Division of Entomology). In future years, when the relation of bio-chemistry to the chemotropic reaction of insects has been more deeply studied, this fascinating phase of beetle control should prove an all powerful weapon in the hands of economic entomologists.

Notes on Fumigation.

Just now, when there is much discussion as to the respective merits of paradichlorobenzene and carbon bisulphide as soil fumigants, it seems to me advisable to make it clear to our growers that the success obtained in other countries with the former chemical (paradichlor) against grubs of cockchafer beetles similar to our own greyback in habits, appearance, and general economy, must not—as some would have us believe—be attributed to the fact that it was obtained in some country other than Australia, and that this being so, such success could not be duplicated under the climatic conditions obtaining in Queensland.

Now, the efficiency of paradichlor. does not depend materially upon the nature of the soil, the flora, or the topography of any particular State or Kingdom in which it may happen to be used, but is influenced by temperature, moisture, and other factors. Similar conditions of temperature occur, of course, during some part of the year over areas of land situated in both the tropical and temperate zones; a fact which has made it possible to use this chemical successfully against subterranean grubs and insects in such widely separated countries as France, America, Queensland, and other intermediate lands. It should be needless to state that its toxic properties remain the same in any part of the world, despite erroneous impressions to the contrary apparently entertained by some cane farmers.

The fumes of paradichlor. are volatilised under temperatures of from 55 to 85 deg. Fahr.; the value and range of this fumigant being largely due and much enhanced by the possession of such wide and convenient latitude of volatility. We find, therefore, that satisfactory results can be secured with small doses (⅛ to ¼ oz.) of the crystalline nodules of this chemical over practically any terrestrial portion of the earth's surface, lying within an immense area embracing about 20 deg. north and 20 deg. south of the equator.

Regarding the use of this fumigant in temperate climates, it is usually during the warm months that injurious insects prove most troublesome, viz., at a time when the temperature of the ground becomes warm enough to ensure effective vapourisation of the crystals.

Control Work against the Weevil Borer.

Early in the month (August) seventy specimens of the Tachinid fly were liberated by Mr. W. A. McDougall on borer-infested areas in the South Johnstone district, where a brief inspection was also made with a view to the discovery of any other insect pests of cane.

It is interesting to record that abundant evidence was found of the establishment of this useful fly parasite amongst cane at the South Johnstone Sugar Experiment Station. Mr. McDougall also noticed that on the various farms visited the poor or unhealthy canes seemed to be the ones most damaged by weevil-borers, and that sticks with spindle top were all heavily infested by this insect.

Growers troubled with "Army Worms" should use an arsenate of lead spray, and are advised to consult the Monthly Hints published in the September numbers of the "Queensland Agricultural Journal" and the "Australian Sugar Journal."

ENTOMOLOGIST'S ADVICE TO CANEGROWERS.

By EDMUND JARVIS.

"Glossy Scrub-Chafer" Emerging.

The dark-purplish or brownish-red beetle, which during normal seasons usually appears on the wing in September and October, is noticeably larger than French's cane-beetle, which is lighter in colour, more slender, and does not fly until a month or two later. The former cockchafer, as its common name implies, occurs chiefly in canefields situated close to, or in the immediate vicinity of, scrub lands, being plentiful at times near Babinda and on farms lying near the foot of the Bellenden-Ker ranges and other mountainous land supporting a dense scrub vegetation.

The grubs of this chafer beetle (*Lepidiota caudata*) are often responsible for damage to cane roots believed by farmers to have been caused by grubs of the commoner "greyback" beetle. Such a mistake is not to be wondered at, seeing that the larvæ of both these species resemble each other very closely in size and general appearance. As a rule, the "glossy scrub-chafer" does not cause serious injury to cane.

"Forewarned is Forearmed."

Growers are again reminded that now is the time to prepare for fighting such insect pests as may chance to make their appearance later on in the warm weather. The purchase of a good spray-pump would never be regretted, and no up-to-date cane farm should be without so useful an appliance, since for an initial outlay of less than £5 a grower can obtain, ready to hand for immediate use if required, the means of saving his young cane from being destroyed or seriously checked in growth by such insects as army worms, grass caterpillars, plant-eating beetles, locusts, or aphides, &c., all of which occasionally devour or damage leaves of sugar-cane. The Auto Spray Pump No. 3A is well adapted for use on most cane farms. This pump has an 8-gallon brass tank, and is equipped with a powerful agitator, 8 feet of high-pressure hose, 8 feet of iron extensions, and a Vermorel nozzle. It is moved about in the field by means of a broad-tyred wheel, and is fitted with iron handles, while the stray is delivered under high pressure.

The agents for these Auto Spray Pumps are Buzacott and Company, Limited, of Adelaide street, Brisbane.

Do not forget to have a few pounds of lead arsenate paste always on hand. This can be procured from Taylor and Elliott Limited, of Charlotte street, Brisbane, in stoneware jars holding 1 lb., costing about 2s. It is a good plan to cover the top of the cork of such jars with a layer of sealing wax, as then the paste will remain moist for years. A pound or two of Paris green should also be purchased as a stand-by, in case it should become necessary at any time to lay down poison bait for cutworms or other caterpillar pests.

Supplies of paradichlorobenzene or carbon bisulphide for fumigating grub-infested soil should be ordered without further delay by communicating with the various secretaries of pest destruction funds, from whom all information regarding such soil fumigants can be obtained at any time.

BULLETIN NO. 2.

A KEY FOR THE FIELD IDENTIFICATION OF SUGAR-CANE DISEASES.

This Bulletin, by Mr. Arthur F. Bell, the Pathologist to the Bureau of Sugar Experiment Stations, Department of Agriculture and Stock, has been the subject of favourable comment from sugar-cane countries in all parts of the world. Amongst many letters received by the Bureau the following may be quoted:—

Dr. Lyon, Consulting Pathologist, Experiment Station, Hawaii, says—

> "I wish to thank you most sincerely for copy of Bulletin. It is well arranged, very concise and accurate, and certainly constitutes the best manual of the diseases of sugar-cane now in existence."

Dr. H. V. Koningsberger, Director, Department of Agriculture, Sugar Experiment Station, Java, says—

> "I have been very much impressed by reading the recent Bulletin by Mr. Bell, and I want to congratulate you on the important papers published by your Bureau. Mr. Bell especially deserves the gratitude of all canegrowing countries for this valuable 'key.'"

Dr. E. W. Brandes, Principal Pathologist in Charge, Sugar-cane Plants, United States Department of Agriculture, says—

> "Without any question this is the most up-to-date and valuable summary of cane diseases that has yet appeared, and will be of service to the sugar-cane industry everywhere."

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HINTS TO SOUTHERN CANEGROWERS.

The Director of the Bureau of Sugar Experiment Stations has received the following Hints to Canegrowers (Southern Districts) from the Assistant Entomologist Bundaberg Sugar Experiment Station, Mr. R. W. Mungomery:—

Clean Up when Ratooning.

In most cases it is customary for growers, after having cut their cane green, to leave the trash for a week or more to dry thoroughly and then to fire it. In this way thousands of eggs of leaf hoppers and moths, &c., are destroyed, which if left would have been potential sources of trouble to the young ratoons, and the field is left in a thoroughly clean condition as far as surface pests are concerned. By the term surface pests this is meant to embrace all those pests that attack the cane plant above the surface of the ground.

Do not leave Trash on Ratoons.

Instead of burning, some growers follow the practice of leaving the trash to rot on the surface of the ground, and allow the cane to volunteer through. From the viewpoint of pests, this is often a harbour and encouragement for them, since certain moths show a decided preference for laying their eggs in such situations, with the result that when the caterpillars hatch from these eggs they straightway commence to feed on the young cane.

The futility of such a practice has often been seen, but especially was this noticeable on a farm that was under observation last year. Part of the trash on a harvested field was burnt, whilst another portion of the same field was left with the trash saved, and it was rather remarkable that the cane in the burnt portion was undamaged at the same time when the volunteer ratoons were almost stripped of leaves by army worms. Such crops affected by army worms usually recover, but it is absolutely unnecessary to subject them to these severe checks when weather conditions in the spring are often so unfavourable for vigorous growth.

Where Caterpillars Develop.

As stated above, certain moths instinctively lay their eggs in places where the resulting caterpillars find excellent conditions for their development, and in this respect trash left on young ratoons provides them with conditions almost approaching ideal. Briefly the habits of these insects are as follows:—The young caterpillars on hatching from the eggs commence to feed on the young green cane leaves. This feeding is more general during the night time, and when daylight appears they retire under the trash and other debris or, as frequently happens, they crawl between the curled leaves of the central spindle. In this way they effectively conceal themselves, only the jagged edges of the leaves and a few pellets of grass betraying their presence, and they remain out of sight from insectivorous birds which would otherwise make a meal of them and help to keep them in check.. However, they go on feeding in this manner, and when they are a little more than half-grown their food requirements increase enormously. If they are in large numbers they cause great damage to the young cane, often stripping the shoots quite bare, and when their food-plants become scarce they often migrate in search of more, and this habit of travelling en masse has earned for them the name of army worms.

During this season, when much cane has been burnt on account of the damage by frost, the amount of trash remaining on the ground will probably be not so great as in former years, but, at the same time, growers will be well advised to rake up and burn all waste material such as partly-burnt cane tops which lie scattered about the fields, for, as previously pointed out, pests seek shelter under this débris.

When to Conserve Trash.

The above warnings concerning the danger of volunteer ratoons is not meant to discourage the practice of trash conservation, which practice in some of our drier areas has much to commend it. Trash conservation, however, is usually done in connection with the last crop of cane harvested, and the cane is cut green, the cane later ploughed out, and the trash ploughed under. In general, as far as surface insects affecting cane are concerned, this practice has in many cases the same ultimate effect as the system of burning. By turning the trash under, many eggs are buried, and if the young larvæ succeed in hatching out, they are unable to penetrate through the thick covering of soil and they soon die. If the few that are not completely covered with soil succeed in hatching out, they find that there is none of their food-plant growing near at hand, and since these tiny caterpillars cannot migrate without food to any great distances they likewise perish unless they happen to find an isolated green shoot. In any case, the number that would actually survive under such conditions represents a very small proportion of the total number of eggs deposited, and therefore the system is quite sound in so far as the destruction of army worms and similar pests is concerned.

CANE PESTS AND DISEASES.

The Assistant Entomologist at the Mackay Sugar Experiment Station has submitted to the Director of the Bureau of Sugar Experiment Stations the following report for the month ended 12th September, 1929:—

Pupae of Greyback Beetle *(Lepidoderma albohirtum* Waterh.*)* and other Small Scarabaeid Grubs.

Following a request made by a grower at Sarina, who was preparing ground for planting, an inspection was carried out on his farm, and it was found that numbers of pupae of the greyback beetle and a great many small scarabaeid grubs were being ploughed up.

The chief object was to determine the identity of the latter, as the grower intended planting cane in the block that he was ploughing, and the presence of large numbers of small grubs naturally caused him anxiety as to whether it would be wise to plant there or not. These small grubs, which were less than ½ inch in length in the curved position, were very numerous amongst the roots of old stools, but they had apparently not caused any injury to the roots. They were in the third stage, so would very possibly pupate either this month or next, therefore planting would be quite safe in any case.

They were identified as belonging to either the genus Heteronyx or Haplonycha; the grubs of beetles belonging to these genera are grass root or humus feeders, and have so far not been recorded from sugar-cane roots. Grubs of these genera are frequently very plentiful in grass paddocks, where they subsist on very fine grass roots and soil. They usually feed only a couple of inches below the surface.

The greyback pupae that were ploughed up were all situated at depths varying from about 6 inches to 1 foot or more; the ground was loose and fairly moist, and the ploughing was very deep. All the pupae examined were well advanced, and from appearances the beetles would be fully developed before the end of this month. That does not necessarily mean that they will emerge from the ground immediately after emergence from the pupal shells; they will remain in their old pupal cells for several weeks for their bodies to harden, also for the advent of warmer weather combined with good soaking rains.

If the first good rains of early summer should fall at the latter part of October or early in November, in all probability the beetle flight will be early this summer—that is, judging by the advanced state of the pupae at the present time. On the other hand, if the dry weather should continue for a further two months or more, the ground may become so hard and consolidated that many of these beetles may be unable to leave their cells and therefore perish in them.

Growers who were troubled with grubs during the past season will be well advised to clear away from the immediate vicinities of their canelands all feeding trees of the beetles, more particularly those growing on the windward side of the cane. Many farmers desire to leave a few of these trees from which to collect the beetles; if any are left for this purpose, they should be small trees which are easily shaken, and even then it is not advisable to leave any that are close to cane. Much tall grass growing near cane at the flighting time of the beetles is also bad, as it serves to attract them to that particular area. They appear to be invariably attracted to the highest cane or grass, and even though the grass may be taller than the young cane and be the source of attraction, yet the grass itself may not be subsequently attacked by grubs whilst the cane suffers. This is due to the fact that grassy headlands are usually uncultivated and the ground is hard and consolidated, which deters the beetles from entering to lay their eggs, consequently they may enter the cultivated ground where the cane is growing, and thus grubs will later attack the cane.

Occurrence of Unknown Beetle Larvae amongst Cane Roots (*Lampyridae* sp.).

Following on inquiry made by a farmer at Pinnacle, who had ploughed up great numbers of small active yellowish grubs whilst ratooning, a visit was subsequently paid to the farm in question to ascertain whether the grubs under notice were causing injury to the cane roots or not.

Inspection revealed the presence of these grubs in almost countless numbers, each one being enclosed within a small oval cell. This would appear to indicate that they had ceased feeding and were preparing to pupate. Several stools were dug up and the earth removed from amongst the roots, but there were no signs whatever indicating that the roots had been damaged.

A similar occurrence of small beetle larvae (and very probably the same species as this will prove to be) occurring very plentifully amongst cane stools was brought under notice by Mr. G. Bates (Assistant Entomologist) several years ago from a farm in the Proserpine district. They were identified when bred through to the beetle stage as *Telephorus* sp., one of the "Soldier Beetles."

The beetles belonging to this family are all more or less elongate insects which fly freely during the daytime, usually amongst timbered country. They have a rather soft integument, not hard and chitinous as in cane beetles, and they are usually some shade of black, dark olive, and brown. In many species of the family the antennae or feelers are long and pectinate or semi-pectinate (feathery).

The usual food of their grubs is recorded as being variable, but many forms are carnivorous or predatory, with a tendency towards cannibalism. There is no doubt, therefore, that cane roots are quite immune from their attacks.

Should any other growers note the occurrence of such like larvae amongst their cane during ratooning or ploughing operations, it may be well to give a brief description of these larvae in order to avoid undue concern.

The colour, including the head, is creamy yellow; body soft and tapering towards both extremities; segments very clearly defined; length, including head, 19-20 millimetres (about 8/10ths inch). The whole body and even the head is slightly flattened. On each of the first, second. and third segments ventrally is a pair of rather large legs, which are the same colour as the body. These grubs are able to move fairly rapidly when dug or ploughed up, but if touched will curl themselves up and remain motionless until the danger is passed.

The disturbing of the ground during cultural operations would tend to be responsible for the destruction of many of these larvae, because on the farm inspected many were being attacked and eaten by two different species of ants—namely, the common "Green Head" (*Chalcoponera matallica* Sm.) and the introduced small brown ant (*Pheidole megacephala*). The latter species has major and minor forms of the worker, the first form have enormous heads which are quite out of all proportion to the sizes of their bodies; these are particularly destructive to other insects.

Wallabies and Cane.

During recent inspections made in the Habana district indications of damage to cane by wallabies were noted in several blocks of plant cane; in one instance the damage was fairly severe. This particular patch of cane was bordered on two sides by open forest land, the fences on those sides being a considerable distance from the cane.

Damage by these animals may occur to either young or mature cane; in the latter case it may be fairly readily distinguished from rat injury, which it resembles by the gnawings into the sticks being uniformly higher from the ground, whereas rat injury is usually more irregular. Sometimes in canefields the "playgrounds" of these animals may be seen, quite a cleared space with the ground almost bare, in amongst the cane.

Wallabies appear to attack cane more readily during dry weather than at other times of the year, no doubt owing to the scarcity of native grasses, &c., during the dry season.

THE JOURNAL APPRECIATED.

A Carbeen farmer writes (3rd September, 1929):—" . . . We much appreciate your good efforts for the betterment of the man on the land through the 'Queensland Agricultural Journal.' "

QUEENSLAND SUGAR-CANE SOILS.

Report on Queensland Sugar-cane Soils, Planting, and Tillage, prepared for the Committee of the International Society of Sugar-cane Technologists by the Bureau of Sugar Experiment Stations.

Owing to the larger part of the cane soils of Queensland being alluvial in character, there is some difficulty in recognising soil types.

In the Cairns district the alluvial soils of the Mossman, Hambledon, and Mulgrave areas may be classed together. They vary in colour from light grey to dark red, but do not show very marked analytical differences. They all belong to the Permo-Carboniferous age.

The following is an analysis of a composite sample from these areas:—

Moisture	1.72
Volatile matter	6.03
Insol. residue	74.65
Chlorine	0.003
Phosphoric acid	0.14
Iron oxide	4.12
Aluminium oxide	8.94
Lime	0.27
Magnesium oxide	0.43
Potash	0.48
Soda	0.18

Soluble in 1 per cent. citric acid—	Per cent.
Phosphoric acid	0.0037
Lime	0.0843
Potash	0.0142

The high percentage of magnesia in comparison to lime is typical of these soils.

The alluvial soils of Innisfail and Mourilyan show great similarity in analyses, except that the former has better P_2O_5 content. Geological age undetermined.

Soils from the Halifax, Ripple Creek, and Ingham sub-districts belong to the Recent and Post Tertiary geological age. They analyse somewhat similar to those from Innisfail and Mourilyan, but have a much lower iron and aluminium content.

The Mulgrave and Innisfail red soils are of volcanic origin and are termed "Bastard Red Soils" owing to their indefinite nature. The former, as will be seen from the average analyses, are a much better type.

MULGRAVE (RED).

Moisture	1.98
Insol. residue	70.43
Volatile matter	7.15
Phosphoric acid	0.22
Chlorine	0.002
Iron oxide	7.18
Aluminium oxide	12.13
Lime	0.32
Magnesium oxide	0.34
Potash	0.40
Soda	0.17

INNISFAIL (RED).

Moisture	4.23
Insol. residue	42.05
Volatile matter	15.78
Phosphoric acid	0.27
Chlorine	0.005
Iron oxide	16.52
Aluminium oxide	20.47
Lime	0.08
Magnesium oxide	0.20
Potash	0.17
Soda	0.20

In the Mackay or Central District, with the exception of Farleigh soils, all are of Recent and Post Tertiary geological age, and all are alluvial.

Farleigh area falls in the Lower Bowen (Freshwater-Marine-Volcanic) series of Permo-Carboniferous age.

In comparison with the Northern or Cairns division, the greater content of CaO and the excess of CaO to MgO is very noticeable. As will be seen from the analysis of composite samples from the Mackay and Proserpine areas and the average of Burdekin soils, very little difference is evident over a wide area:—

MACKAY AND PROSERPINE.

Moisture	2.35
Volatile matter	6.76
Insol. residue	79.01
Chlorine	0.004
Phosphoric acid	0.17
Iron oxide	3.97
Aluminium oxide	5.93
Lime	0.75
Magnesium oxide	0.52
Potash	0.20
Soda	0.21

BURDEKIN.

Moisture	2.33
Volatile matter	6.14
Insol. residue	80.44
Chlorine	0.004
Phosphoric acid	0.19
Iron oxide	3.41
Aluminium oxide	5.17
Lime	0.96
Magnesium oxide	0.73
Potash	0.35
Soda	0.14

With regard to the Bundaberg or Southern division, the soils immediately around Bundaberg are of Basaltic origin.

Planting.

Only minor differences exist in planting, the methods being practically the same throughout. Less cane is used per acre in the Southern or subtropical cane areas.

Fowler steam ploughs are used on a few plantations, but as the greater part of the cane is grown by small farmers in Queensland, whose average acreage under cane is 36, the bulk of preparation is done by tractor and horse tillage. The tractors principally used are the Fordson, McCormack, Deering, Hart Parr, Holt, Ruston Hornsby, Cletrac, Renault, Fiat, Twin City, Austin, and British Wallis.

Planting is done on well-prepared cultivable land, three to four ploughings in drills varying from 4 feet 6 inches for thin erect canes to 6 feet for thicker canes. Space between plants varies from continuous planting (very little of this is done) to 18 inches apart. The greater part of the cane planting is in 5-feet rows and 6 inches apart. Practically the whole of the cane is used cut up into three or four eye plants, in furrows or drills about 10 inches deep.

In many districts a cane planting machine is used. Cane plants receive about 2 inches of covering where soil is moist, and 3 to 4 inches were dry.

In what is known as new scrub land the cane plants are deposited in holes. The holes are usually made 14 by 9 by 9 inches. The number of holes varies from 2,500 to 3,000 per acre.

Planting in the subtropical areas is usually done from December to April and from August to October. The first period is known as "early" planting and the second as "late." In the north (tropical) areas cane planting is carried out as "early" in March and April and "late" in July to October.

Tillage is generally done with shallow cultivating implements, such as the Planet Junior or else with a Cotton King disc harrow—mostly horse drawn, though some implements are tractor drawn. In wet areas, ploughs are often used to plough away and plough to the young cane where a heavy growth of weeds has taken place, but this practice is not regarded with favour.

In the subtropical districts, up to third ratoons are frequently grown; in the Central district, up to second ratoons; and in the North, generally only one ratoon is grown. Trash is generally burnt, and after this is done the following methods are practised:—

(*a*) Trash burnt and four furrows to 9 inches ploughed between cane rows. Land levelled down by use of tyne harrows or cultivator.

(*b*) Trash burnt, procedure same as above, but only three furrows ploughed between rows.

(*c*) Trash burnt and ground cut up first with disc harrows crossways. Then use of plough between rows followed by tyne harrows crossways.

(*d*) Trash burnt, four furrows ploughed between rows and skeleton plough used in furrows next to cane.

(*e*) Trash burnt and land treated with spring-tooth cultivator or a grubber instead of being ploughed.

(*f*) Trash left and rolled in each alternate interspace. Every other interspace well cultivated with the plough. In this way each row of cane has one side cultivated, and one side uncultivated but covered with trash.

(*g*) Trash left and cane allowed to volunteer without any cultivation at all. This method is sometimes advantageous in a droughty season, but is not to be recommended as a regular thing.

(*h*) Thoroughly stirring the land between the cane stools to a depth of 16 inches with the plough and sub-soiler.

All these methods are in use, or some variation of them. In the writer's opinion the best cultivated ratoons (other things being equal) give the highest yields, but it is often a question of cost.

PLATE 128.—BLOWING MACHINE FOR SPREADING INSECTICIDES OVER CANE FIELDS UNDER TRIAL IN JAVA.

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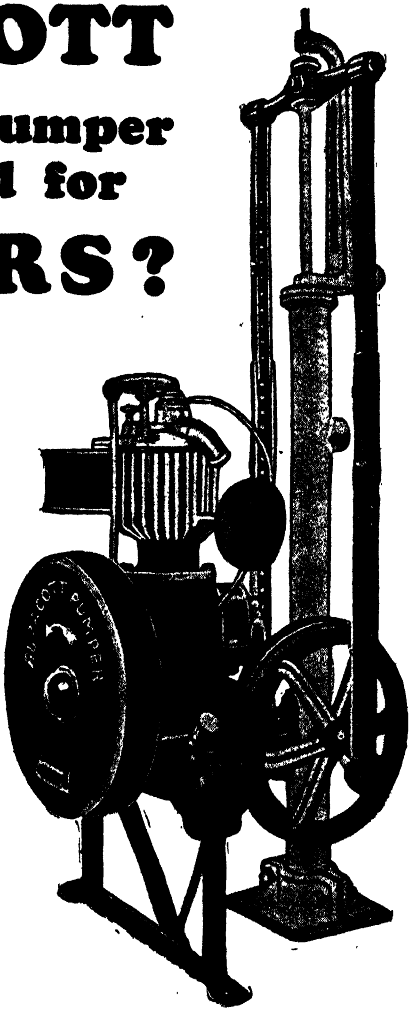

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COB ROT OF MAIZE.

By R. B. MORWOOD, M.Sc., Assistant Plant Pathologist.

Cob rot of maize is a general complaint in the maizegrowing areas of the United States of America and South Africa. It was reported from Australia in 1918 by Dr. Darnell Smith, who stated that it was a serious disease which appeared to be spreading. Henry Tryon recorded the disease in Southern Queensland in 1919, and then in 1925 wrote of it as seriously affecting the quality of maize throughout the Atherton Tableland with, in places, a heavy percentage of damaged cobs. During the past season cob rot has appeared in a number of centres in the South as well as on the Tableland, and as many of the growers are unfamiliar with the nature of this disease a short description of it is given below.

Symptoms.

The cobs which are badly affected with the rot can be distinguished externally by their light weight and by a feeling of compactness. The husks tend to cling together and are more difficult to remove. The disease is caused by a fungus, the presence of which can usually be readily discerned on removing the husks. It appears as a light grey mould like growth lying between and around the grains and sometimes extending to the husks, which may become firmly matted together. (Plate 129.) The mould is commonly more abundant at one or the other end of the cob corresponding to the region first invaded. In most cases, except those of light infection, the grains are discoloured, often of a duller appearance, and their contents are of a more crumbly nature.

Cause.

Cob rot can be brought about by several fungi, of which the most serious causal agent, both in Queensland and elsewhere, is *Diplodia zeae* Lév., which is the one discussed in these notes. A second parasitic fungus—*Fusarium moniliforme* Sheld.—is also a cause of cob rot in Queensland. This form can usually, but not always, be distinguished by a pink tinge given to the affected portion of the cob. Saprophytic fungi—*i.e.*, fungi which live on dead and rotting matter, are often found associated with cob rot when the cobs are exposed to the entrance of such organisms by the previous attack of corn ear worm or by excessively wet conditions.

The fungus *Diplodia zeae* is able to grow on all parts of the maize plant. Under the ground it can cause a root rot condition. On leaves and stem it produces reddish or purple spots. On the cobs it gives the symptoms noted above. The mould growth mentioned consists of a mass of fine interlaced threads of mycelium of the fungus. The vegetative stage in the life history of the fungus is followed when conditions are suitable by the reproductive stage. This appears to the naked eye as small black dots which, under the microscope, are seen to be hollow globular receptacles, known scientifically as pycnidia, containing numerous minute brown two-celled spores. (Plates 130 and 131.)* These spores are blown about by the wind and frequently lodge between the leaf sheath and stem or on the shank or tip of the cob of a maize plant. In these situations they often find sufficient moisture to germinate, and on doing so infect the plant. The effect on the stalk and leaves is rarely of a serious nature, but on the cob all stages from barely perceptible infection to complete destruction may result.

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* Plate 131 is reproduced from Henry Tryon's "Ear Rot of Maize" and represents drawings of material prepared by that author.

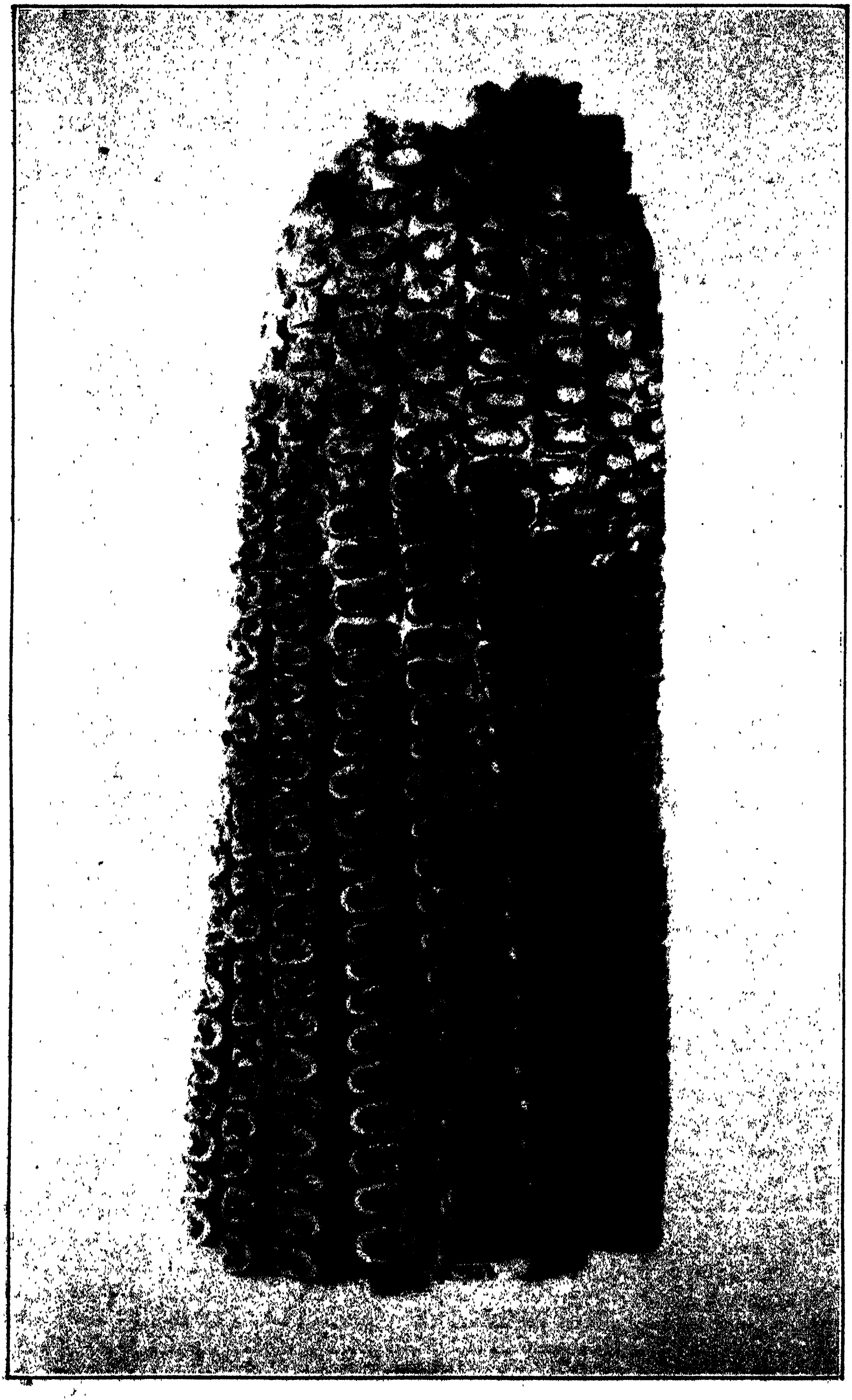

PLATE 129.—COB ROT OF MAIZE—*Diplodia zeae*.
Showing mould arising from infection at the tip of the cob.

Plate 130.—Cob Rot of Maize—*Diplodia zeae*.
Pycnidia of the fungus on the husks of an affected cob (slightly enlarged).

The point of infection is usually one or other end of the cob, and from there the fungus spreads between the grains and also penetrating them breaks down their contents to a soft, crumbly mass. If conditions are sufficiently moist the small black pycnidia appear on the mycelium at the base of the grain. They are also produced on the husks, the core of the cob, and on the leaves and stem. (Plate 130.)

Source of Infection.

The most serious source of infection is the quantity of old broken stalks, &c., remaining in the ground from a previously affected crop. It has been shown that maize grown on land which has not been cropped to maize for three years and which is isolated from sources of windborne infection from neighbouring crops does not usually develop the cob rot symptoms.

Seed from a diseased crop is often dead as a result of the fungus invasion and fails to germinate. It may, however, if lightly infected, produce weak seedlings which grow into stunted plants often affected with root rot. As the fungus grows inside the seed, treatment with bluestone or fungicidal dusts does not eradicate it. Hence it is necessary to obtain seed which is not infected. This cannot be done with certainty by taking apparently good cobs from a field in which the disease is present. One method of making certain that a cob is fit for seed is to take grains from various parts of it and germinate them. Only cobs whose seeds produce clean, strong seedlings can be pronounced free. The best plan is to obtain seed from a crop in which careful examination has failed to show the presence of cob rot.

Contributing Conditions.

The disease develops to a greater extent under warm, moist conditions. This means that other things being equal it will be worse with the moister conditions obtaining in a thick crop than in one which is thinner. Also, under good weather conditions in which the crop dries off rapidly after reaching maturity, the fungus does not get the opportunity to do so much damage as it otherwise would. Further, if the crop is taken off and placed in shelter as soon as it is mature and quite dry, the possibility of it again getting wet and thereby allowing the fungus to spread further will be prevented.

Control.

The following control measures for the disease are recommended:—

(1) Burn all remains of the crop after harvesting. In order to minimise the spread of the fungus this should be carried out as early as practicable.

(2) Rotate maize land with other crops.

(3) Use sound seed preferably selected from a crop which is known to be free from the disease.

(4) Harvest the crop as soon as it is dry.

It is inadvisable to use damaged grain as fodder. Experiments conducted in South Africa have shown that maize containing *Diplodia zeae* when ingested in considerable quantities is poisonous to cattle and sheep. With respect to horses and pigs, the matter is still in doubt, though it can be taken that there is no cause for alarm over the consumption of a small amount along with wholesome food. Owing to the possibility of the spores passing through an animal uninjured, the feeding of diseased material may help to spread the disease, and is also on that account better avoided.

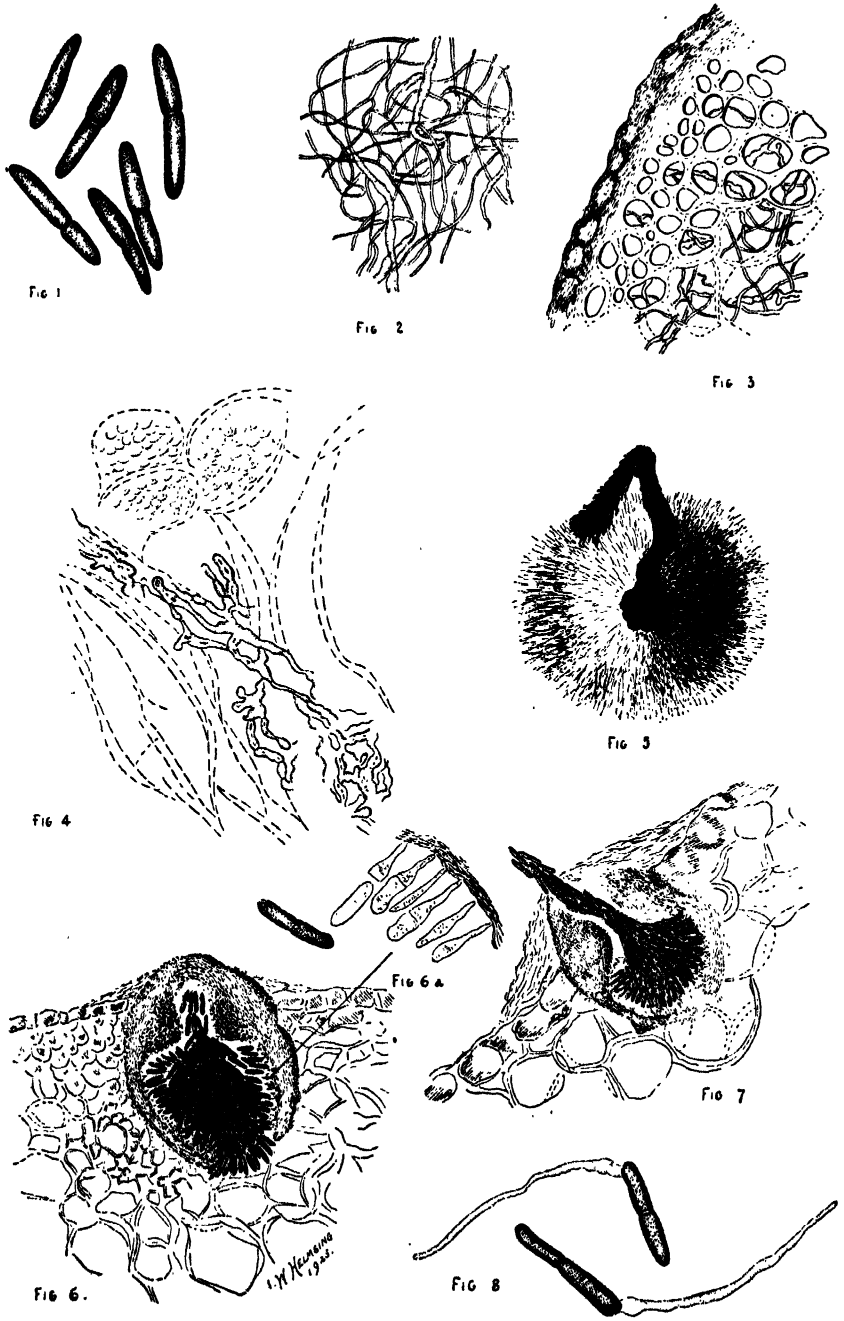

Plate 131.—Diplodia zeae.

A. Infective agent: Fig. 1, Spores. B. Vegetative growth: Fig. 2, Mycelial threads; Fig. 3, Mycelium traversing tissue cells of husk; Fig. 4, Mycelium in tissue of seed germ. C. Reproductive growth: Fig. 5, Surface view of pycnidium extruding spore filament; Figs. 6 and 7, Longitudinal section of pycnidia in position; Fig. 6a, Enlarged view of inner wall of pycnidium, showing spore formation; Fig. 8, Spore germination and formation of germ tube. (All highly magnified).

DISEASES OF PINEAPPLES.*

By J. H. SIMMONDS, M.Sc., Plant Pathologist.

The pathological problems to which reference will now be made are the following:—Wilt, base rot, Thielaviopsis fruit rot, fruitlet core rot, top rot, and tangle root. Before discussing these problems a brief reference must, however, be made to certain features in the growth habits of the pineapple.

The pineapple belongs to a family of plants many of whose members live on trees and rocks, where they have become adapted to more or less of an air-dwelling habit. Although itself a soil-inhabiting species, the pineapple resembles these plants to a certain extent in structural features, and possibly as a correlated character exhibits a marked intolerance of conditions leading to bad soil aeration.

The pineapple is also a heavy feeder, and judicious fertilising is necessary on any but good soils. Poor drainage and lack of the necessary soil nutriments constitute the primary cause for much of the so-called disease met with in Queensland. There are, however, several specific diseases of a parasitic nature which will be found included below.

Wilt.

The presence of pineapple wilt in a field is indicated by the appearance of certain areas in which the plants exhibit a general unthrifty condition, together with a stunting of the plants and any fruit which may be produced. The leaves assume a reddish-yellow colouration in marked contrast to the normal healthy green. They commence to turn brown and dry out from the tip, giving rise to the appearance suggesting the common name of wilt. Examination of the affected plants will show that, corresponding to the outward manifestations of disease, the root system will present various stages of decay. Even before external symptoms become visible the younger rootlets may be found to have perished.

CAUSE.

This disease was investigated and reported on by Tryon as early as 1893. A further full account of these researches was published in the "Queensland Agricultural Journal," vol. xv., 1904. Tryon found that there was a definite fungus associated with the decay of the roots. This organism, however, was unable to infect plants unless they were previously subjected to some unfavourable growing conditions which impaired their vitality. He was able to show, by extensive field observations and by the elimination of other possible factors, that the contributing condition was to be found in the nature of the soil and its drainage. Wilt makes its appearance when the crop is grown on soil of shallow depth with a stiff subsoil. The pineapple is a plant which is able to grow well under quite moist conditions, provided drainage is adequate, but it is unable to resist the ill-effects of standing water.

From a consideration of the past history of the disease it was shown that a contributing cause was the occurrence of periods of unusually cold weather at the time when the plants were subjected to heavy rainfall.

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* Reprinted from "Pests and Diseases of Queensland Fruits and Vegetables" by Robert Veitch, B.Sc., F.E.S., and J. H. Simmonds, M.Sc., published by the Department of Agriculture and Stock, Brisbane, 1929.

CONTROL.

In order to avoid having trouble of this nature, growers should not plant on shallow, poorly drained land. If for any reason such land has to be used, a system of artificial drainage will be found beneficial.

On poor land "wilt" symptoms may also arise as the result of some deficiency in plant food. The remedy for this would naturally lie in improving the growing conditions by judicious manuring.

Base Rot.

There are two characteristic diseases induced in the pineapple by the fungus *Thielaviopsis paradoxa*. One is the decay of the stem known as base rot, the other is a soft rot of the fruit which will be dealt with subsequently.

SYMPTOMS.

Pineapple suckers sometimes fail to develop normally after planting out. Such plants remain more or less at a standstill and cease to produce new growth. Later a yellowing and withering of the leaves commences and the sucker eventually dies. The plants exhibiting these symptoms will be found to be loose in the ground, and closer examination will disclose a black area of rot invading the base of the stem. (Plate 132, fig 1.) The rot gradually extends until the whole of the lower part of the sucker, together with some of the lower leaf-bases, may be involved. The plant is then liable to break off at ground-level.

Older plants are sometimes affected with this trouble, the symptoms being very similar to those described above.

A loss of as many as 80 per cent. of the suckers from one planting has been reported during a wet season. The average is, however, considerably less than this.

CAUSE.

This rot is caused by a fungus (*Thielaviopsis paradoxa*) which may infect the plant through wounds, or under favourable conditions even through the uninjured surface. Within the invaded area there is set up a soft rot which is at first brown but later changes to an almost sooty black colour owing to the development, from the fungal threads or mycelium within the tissue, of very numerous dark-brown oval spores. These spores are liberated by the complete decay of the affected part and then serve to further spread the disease.

CONTROL.

1. After pulling, and if necessary stripping the suckers ready for planting, dry in the sun for a few days.

2. Avoid planting during very wet weather.

3. As a further precaution the stripped suckers may be dipped in strong Bordeaux mixture before drying. Dipping alone cannot be relied on to give satisfactory control.

4. All diseased suckers, &c., should be removed and burnt. Otherwise the spores of which the rotting tissue is full will be liberated into the soil, where they will be available to produce further infection in new plants.

Thielaviopsis Fruit Rot.

The same fungus (*Thielaviopsis paradoxa*) as that implicated in base rot is the cause of a rot of the ripening fruit, especially when this has become bruised or otherwise injured by rough handling. On the

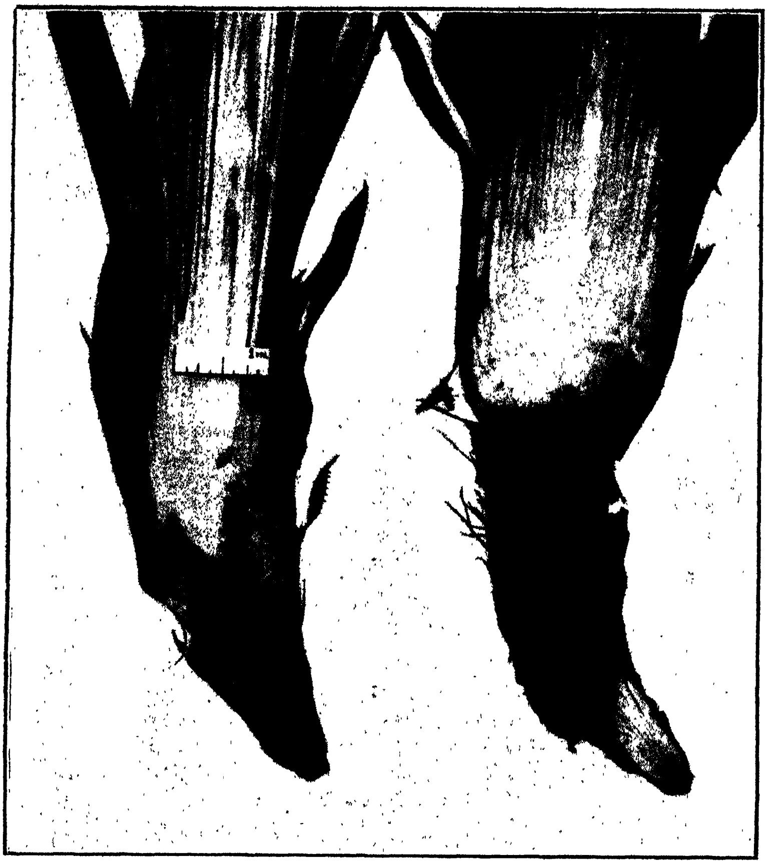

Fig. 1.—Base Rot of Pineapple Suckers.

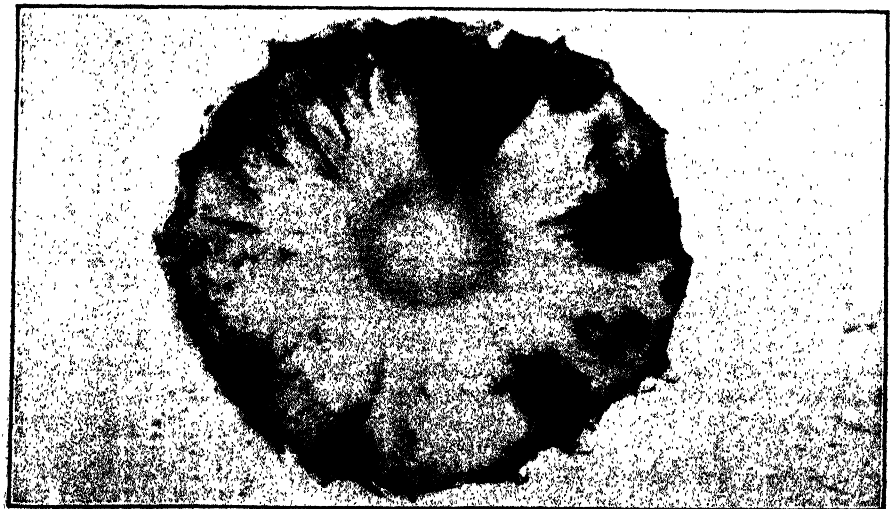

Fig. 2.—Fruitlet Core Rot.

PLATE 132.

fruit the rot will be indicated externally by the presence of a dark somewhat sunken area on the skin. Internally the affected region is at first watery and yellow, but later turns black as the macrospores of the fungus commence to be developed.

Occasionally the leaf of the pineapple is attacked, giving rise to light-yellow or straw-coloured spots of fairly regular outline surrounded by a narrow brown margin. These spots are usually developed in connection with scratches caused by the spines of contiguous leaves. While not in sufficient numbers to have any deleterious effect on the plant, these lesions may serve as one means for the perpetuation of the fungus in the field.

To avoid Thielaviopsis fruit rot care must be given to handling and packing in order to avoid any injury which might aid the fungus in its attack. The farm must be kept free from rotting fruit and other pineapple refuse, as this may cause the accumulation of the fungus spores, which will contaminate the air in which marketable fruit has to lie.

Fruitlet Core Rot.

This disease is one found more commonly in connection with the winter crop of pines at a time when loss can be ill afforded on account of the high prices then obtainable.

SYMPTOMS.

The first symptoms may appear as the fruit approaches maturity, in the form of a failure of an isolated fruitlet or group of fruitlets to mature in conformity with the rest of the fruit. The affected portion retains a greenish colour while the rest is undergoing the normal yellowing. In other cases an affected fruit may exhibit no apparent external symptoms of the decay which may be present within. On cutting through one of these affected fruitlets there will be found a more or less extensive area of brown decay extending inwards from the base of the floral chamber. (Plate 132, fig. 2.) The extent to which the rot will extend depends on the number of fruitlets affected in the first place, and the conditions to which the fruit has been subjected favouring spread through the tissue. In some cases a considerable portion of the fruit may be involved, while in others there is little interference with the edible qualities.

CAUSE.

Fruitlet core rot was first investigated in Queensland by Tryon in 1898, and the results of his work published in the "Agricultural Journal" of that year. He considered a mite (*Tarsonemus ananas* Tryon) to be the primary cause of the trouble so far as the Ripley Queen variety of pines was concerned. This mite is found in the cavity enclosed by the fleshy floral organs of the fruitlets, and in pursuance of its feeding habits pierces the softer tissue at the base of this floral chamber. A fungus (*?Monilia sp.*) which commonly occurs in the cavity is able to extend by means of these injuries and set up the rotting condition characteristic of the disease. The same author considered a similar disease affecting the smooth-leaf pine to be of a somewhat different character, since the fungus associated with it belonged to the genus *Penicillium*. Lately isolations made in separate instances from Ripley pines have yielded a *Penicillium* and a *Fusarium* apparently unassociated with other organisms, suggesting their possible causal relation to the rot.

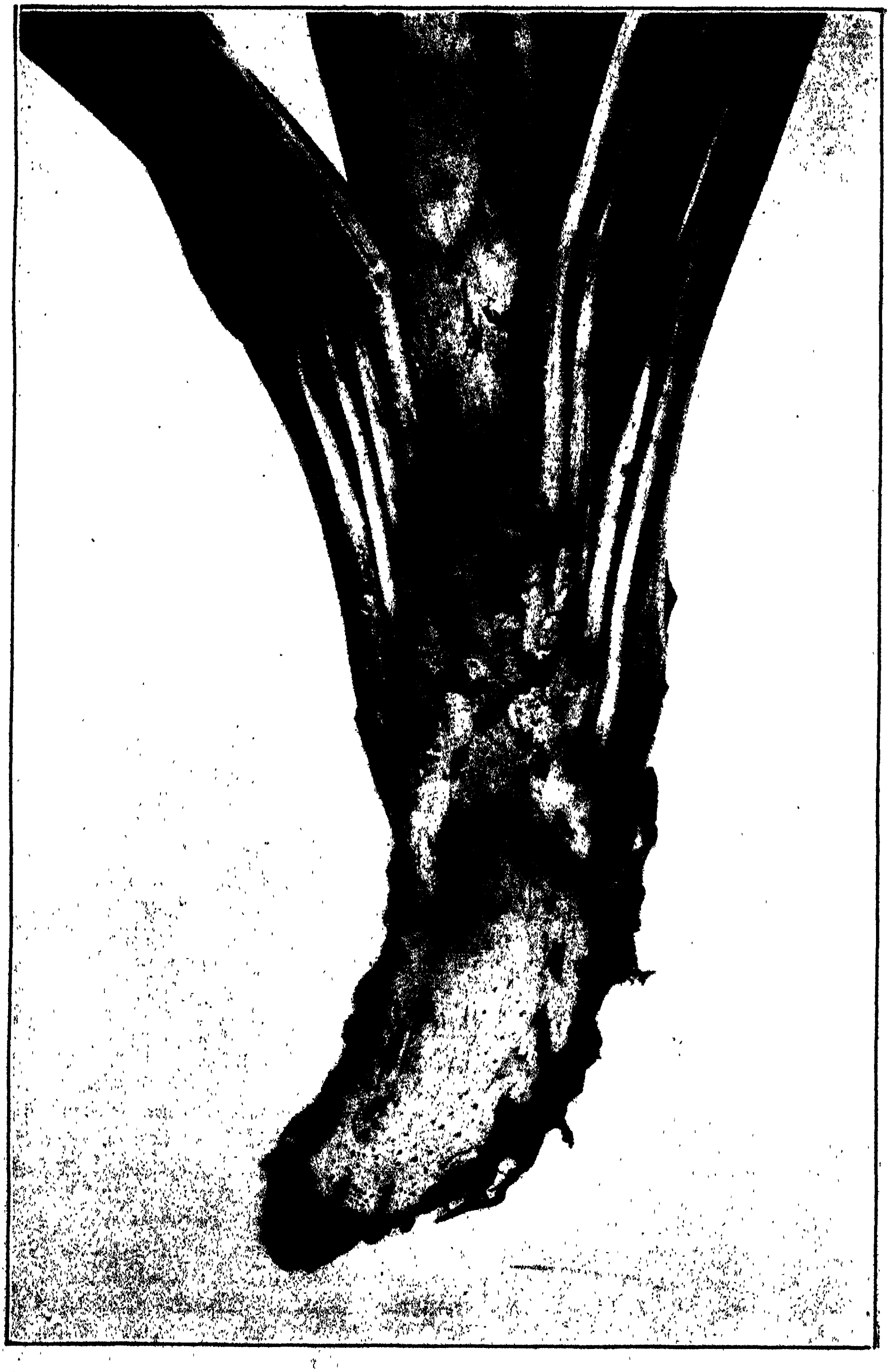

PLATE 133.—LONGITUDINAL SECTION OF PINEAPPLE AFFECTED WITH TOP ROT.

CONTROL.

Before definite control measures can be recommended, further research will have to be undertaken into the general biology of the pineapple flower and the various fungi associated with rots of this type, giving special attention to their mode of transmission, infection, &c.

It has been noted that the extent of rotting is aggravated by tight packing, and care in this respect may help to alleviate the damage caused by this disease.

Top Rot.

Top rot is a disease which is rather sporadic in its distribution and for this reason may be unknown to many. It is only recently that this trouble has received attention, and many points have to be cleared up before definite control measures can be advocated. However, since a number of growers are concerned regarding this disease, a short note dealing with it is included here.

SYMPTOMS.

The general appearance of a plant affected with top rot is not unlike the condition commonly known as "wilt." There is usually a certain amount of stunting and yellowing of the plant as a whole, and the leaves, especially the younger more upstanding ones, die back and shrivel from their tips. Finally the leaves fall flat and the plant breaks off about ground-level, when the upper portion of the stem will be found to be completely rotten. In the early stages of the disease, in order to determine whether top rot, rather than other causes of "wilt" symptoms, is present, it is necessary to attempt to pull out the terminal crown of leaves. If the plant is affected this will come away easily, and the leaves will be found to exhibit a light or somewhat mud-coloured rot at their base.

Infection appears to commence at the top of the stem. A longitudinal section of an affected plant will show an area of rotting tissue, flat-white in colour, near the apex. This may be of a fairly firm nature, but commonly invasion of soft-rot organisms produces a foul-smelling soft rot. (Plate 133.) The rot extends through the stem, working up through the leaf-bases as these are reached. The leaves are not usually invaded for more than half an inch up except towards the top of the stem, where more may be included and even the whole of the young terminal shoot affected. The advancing edge of rot in the leaves is defined by a somewhat irregular water-soaked band, while in the stem and older leaf-bases there is a definite dark-brown border. Top rot may affect scattered plants, but it is more common to find certain areas of the plantation exhibiting a fairly high percentage of infection while the rest is practically free. A loss of from 60 to 70 per cent. has been noted in such places. This localisation does not appear to be dependent on special soil factors.

The disease may be found affecting all the common commercial varieties of pineapple, though possibly the Ripley variety has shown the highest infection. Plants grown with and without paper mulch may be attacked. Loss from top rot occurs in new plantings before the first fruit are thrown; older plants appear to be rarely attacked.

Top rot makes its appearance about the middle of winter, and from then onwards until early summer plants may be found showing the disease in various stages. Apparently the disease reaches serious proportions only after seasons when the summer and autumn rains have been exceptionally heavy.

Control.

A fungus (*Phytophthora sp.*) has been isolated in several instances from the margin of invasion into young leaves. Although it is considered possible that this organism is causally related to the disease, a definite conclusion will have to await the results of inoculating this fungus into healthy pines. In the meantime it may be assumed that the disease is of a parasitic nature. There is also evidence that spread of the disease takes place by means of spores formed in connection with the decaying leaf-bases. The water lodging round the bases of the leaves forms an excellent situation in which spore production and also infection may take place.

It is therefore recommended that affected plants be carefully removed and burnt as soon as they are detected; in this way spread of the disease may be considerably checked. Some growers have been in the habit of leaving the old butt in the ground, since a shoot will often appear from below the rotted region and a healthy plant result. This is unwise, as the remains of the previously rotted portion may serve to spread the disease to other plants later.

Tangle Root.

Tangle root is not a disease of a parasitic nature, but is due to a combination of certain unfavourable meteorological and soil conditions.

Symptoms.

Tangle root appears usually in a newly planted field. Certain of the young plants fail to keep pace with their companions, and commence to assume a reddish-yellow colouration of the leaves, which gradually die back from the tips. The number of affected plants varies considerably, and these are usually scattered indiscriminately along the rows.

Cause.

The aboveground symptoms somewhat resemble wilt, but on pulling up a plant the difference will become apparent. It will be found that the roots, in place of radiating evenly from the base of the sucker, are wound tightly round the stem beneath the persistent leaf-bases. (Plate 134.) The roots in this condition are unable to perform their normal function of nourishing and sustaining the growth of the plant.

The trouble arises from planting suckers during dry weather in badly worked or stiff soil. Under these conditions the lower leaves do not rot off, and the roots developing from dormant buds lying beneath them are forced to circumnavigate the stem in their efforts to find a way out of the soil. Daughter suckers on older plants may sometimes exhibit the same trouble and fail to root, when, as is usually the case, they bend over to the ground, thus leaving the fruit less well nourished.

Control.

1. Tangle root may be easily prevented by stripping off a few of the lower leaves of the suckers, which should then be dried for a few days in the sun in order to lessen the chance of subsequent rotting by *Thielaviopsis*.

2. Plant only in well-worked land that is not in an excessively dry condition. See that good cultivation is afterwards maintained.

Other Pineapple Diseases.

Certain other diseases of the pineapple, such as black heart and water blister, are more or less of seasonal occurrence, and are possibly of physiological rather than parasitic origin. Little is known regarding these maladies, and investigation of these and other pineapple diseases is being prosecuted as opportunity permits.

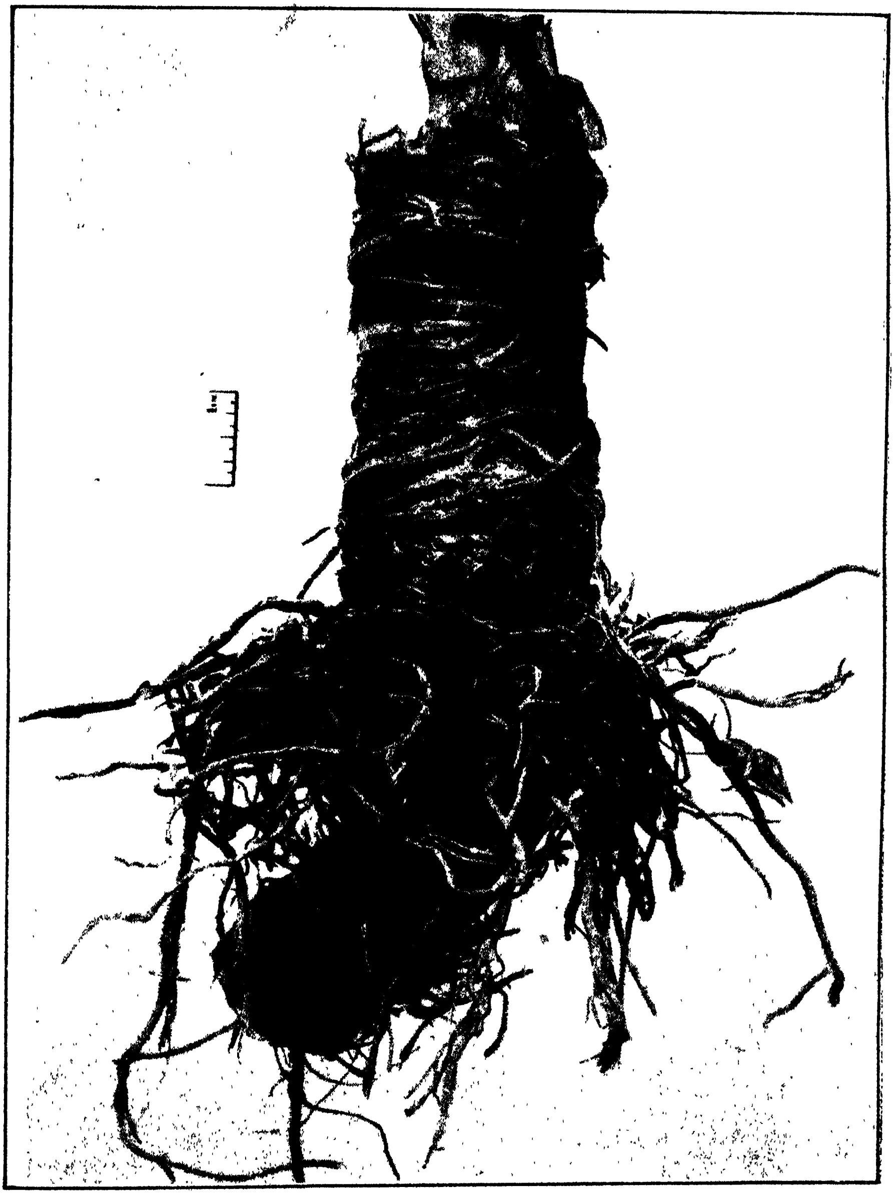

Plate 134.—Pineapple Plant with Leaf-bases removed to show Tangle Root condition.

PLATE 135.—WIDE BAY AND BURNETT DISTRICT EXHIBIT, 1ST IN A GRADE. ROYAL NATIONAL SHOW, BRISBANE, 1929.

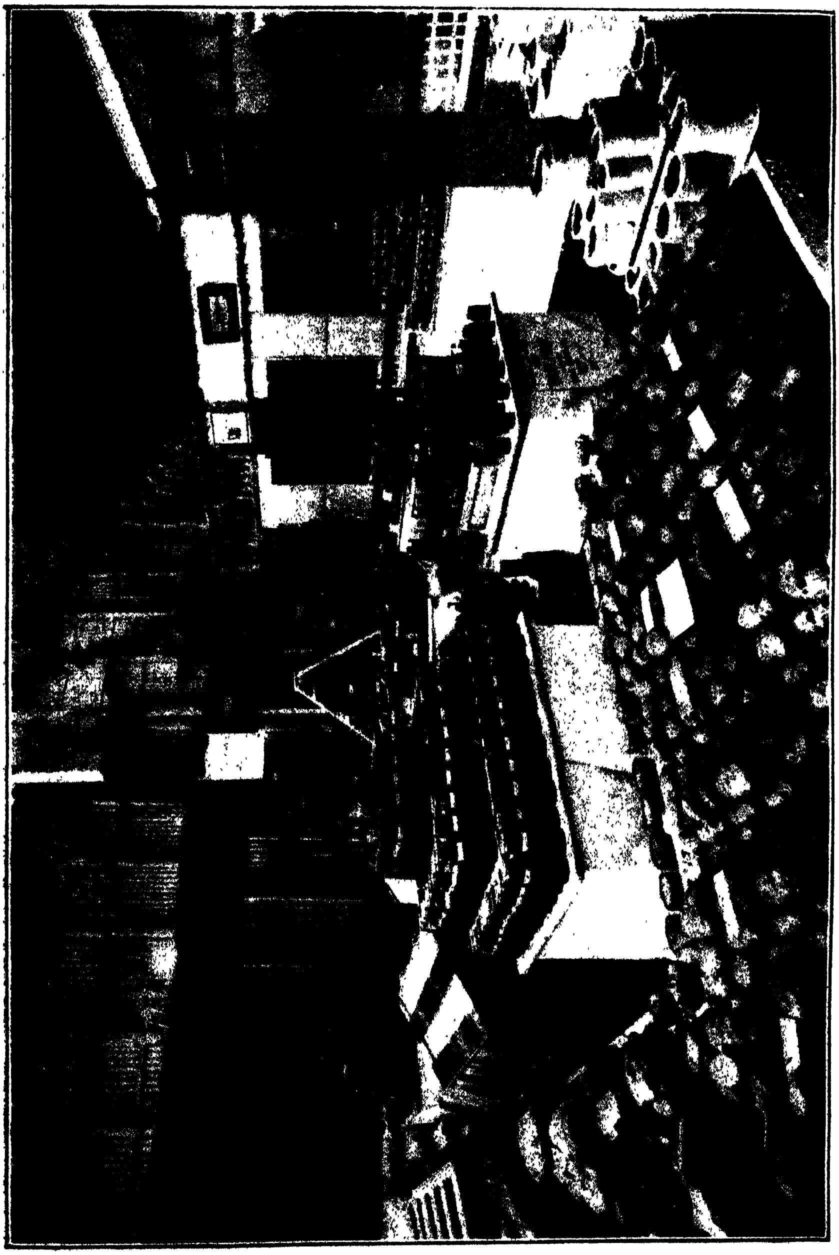

Plate 136.—Brisbane Valley District Exhibit, 1st in B Grade. Royal National Show, 1929.
The great and varied resources of the valley of the Brisbane River were well illustrated at the recent Exhibition.

AGRICULTURAL BANK ACT.

MINISTER'S SPEECH ON AMENDING MEASURE.

A BILL to amend the Agricultural Bank Act was introduced to the Legislative Assembly on 5th September by the Minister for Agriculture and Stock, Hon. Harry F. Walker. In the course of his initiatory speech, which is taken from "Hansard," Mr. Walker said:—

This is a very small Bill, which the Government have considered desirable to introduce as a result of experience during the last few months. One of the objects of this Bill is to provide for the granting of relief to necessitous clients of the Agricultural Bank in the payment of their instalments of interest and redemption. Usually borrowers are in a position to fulfil their obligations, but occasions arise when it is desirable to be in a position to extend as much leniency as possible. At the present time relief can only be afforded by the making of a fresh advance involving the execution of further securities, and always a certain amount of expense. This Bill will obviate this unsatisfactory position.

When the original Agricultural Bank Act was passed in 1901, the intention was that the Crown, as usual, should have priority over all other creditors; but, following on the passing of the Agricultural Bank Act of 1923, it was found that a purchaser buying a foreclosed property from the Agricultural Bank became liable for all arrears of rates thereon. This Bill will give the Crown's debt its usual priority over all other charges, assessments, etc., that may have been levied by various authorities. It provides, also, that local authority rates and other dues shall not be recoverable from the bank or the person who buys the foreclosed property from the bank. However, where sufficient moneys are realised on the sale of the assets, the bank may liquidate such rates, &c., out of the surplus. That is the principal clause of the Bill, and the only one which you can say is of any great importance in it. This amendment arises from a decision given in a recent law case.

There is another small clause giving the manager of the Agricultural Bank or any officer of that bank the right to become an auctioneer to sell properties disposed of by the bank.

Mr. W. Forgan Smith: Those are properties where the bank is in possession?

The SECRETARY FOR AGRICULTURE: That is so—properties of which the bank is in posession and which are about to be sold. This clause will place the manager or an officer of the bank on the same footing and possessing the same power as is held by an officer of the Public Curator. That is the sum total of the Bill, which is quite a small one.

The limit of the advance is 16s. in the £1; but in some cases applicants are advanced the full amount required. This Bill will not affect the advances made by the bank.

Financing New Settlers.

I realise the hardship imposed on new settlers so far as finance is concerned on account of the tightness of the money market; but their lot has been eased somewhat by the smoothness of the working of the administration, although the advances specified in the Act at the present time cannot be altered because of the present position of the money market. I think the main objection with regard to the Agricultural Bank is due to the fact that the whole of its administration is from Brisbane, and its clients extend as far as the Atherton Tableland and even further north. Consequently, certain delays have taken place. I hope that, as time goes on and more capital is obtained, the bank will have more money at its disposal. That will enable applications for loans to be expedited, and obviate the delay arising in connection with making advances to clients.

MR. WALKER'S SECOND READING SPEECH.

Subjoined is the "Hansard" report of Mr. Walker's second reading speech on the measure:—

The SECRETARY FOR AGRICULTURE (Hon. H. F. Walker, *Cooroora*): I have very little to add to what I said when introducing this measure beyond stating that, when the original Agricultural Bank Act was put on the statute-book in 1901, it was intended that moneys advanced under the Act should be secured to the Crown in priority to all other charges, liens, or encumbrances, and, further, that the bank's security should be prevented from being disturbed by any means whatsoever, including any sale under a judgment, execution, or any process of law. Hence, in the Act and subsequent legislation dealing with the making of advances by the Crown, it is provided that no judgment, order, or decree of any court of law shall in any way interfere with the security for any advances made.

In view of counsel's opinion obtained in 1924, it has been contended by the Crown since that date that section 25 of "*The Agricultural Bank Act of* 1923" provides that, from and after the execution of any mortgage in favour of the bank, any rates levied by and payable to any local authority in respect of a property mortgaged to the bank were not protected, and that the bank was not liable for the payment of rates, and that a purchaser from the bank obtained a title free from arrears of rates. That is the principal clause in the Bill; the others, which are of a minor character, have been dealt with minutely. . . .

The Bank's Liability.

. . . . Recently, a local authority sued a purchaser from the bank, as the duly constituted agent for the Secretary for Public Lands, of a property mortgaged to the Secretary for Public Lands to secure the repayment of certain advances under the provisions of the Discharged Soldiers' Settlement Acts, which Acts are read and construed as one with "*The Agricultural Bank Act of* 1923," for rates which had accrued prior to the date of sale, and succeeded. The then Government authorised the bank to appeal against the decision; but the Full Court of Queensland dismissed the appeal. The effect of the Full Court's decision is that, in the event of any sale by the bank as mortgagee in possession, or as agent for the Secretary for Public Lands, the purchaser may be liable for the payment of arrears of rates. As a matter of fact, the judgment went a great deal further. The bank to-day is not only responsible for the arrears of rates, but is also responsible for such items as the Leader of the Opposition mentioned just a few moments ago. It also makes the bank responsible for the clearing of noxious weeds on behalf of local authorities, and is also responsible under the Fencing Act. The Agricultural Bank was established for the one purpose of helping people on the land in poor circumstances, and should never be liable for any of those matters to which I have referred. Of course, some people think the Agricultural Bank should be put on the same footing as a private bank.

Mr. W. Forgan Smith: It could not be.

The SECRETARY FOR AGRICULTURE: The Leader of the Opposition, who administered this Act for some considerable time, knows that that could not be, for the simple reason that it is purely a bank to help the small selector to get a start in life.

Mr. W. Forgan Smith: In addition to that, you pay interest on all money you use, and do not have the same margin to work on as an ordinary trading bank.

The SECRETARY FOR AGRICULTURE: A private bank charges a great deal more interest. Private banks also get better customers, and they also have power to judge as to the character of an individual, and so on, whereas the Agricultural Bank has to take an applicant on his face value—that is, on the report as to whether the work can be done, and whether the security is sufficient to cover the loan.

Mr. W. Forgan Smith: They take into consideration the individual applicant, too.

The SECRETARY FOR AGRICULTURE: We thought the Agricultural Bank was secured in such a way that the bank could carry on; but since this judgment of the Full Court, we find the bank is liable for thousands of pounds, which may be called in at a moment's notice. Naturally no bank could stand that. The ordinary bank, when making an advance, can secure itself in many ways. First of all, it is a bank of profit; secondly, it can take into account the character of the individual; and, thirdly, private banks have establishments all over Queensland in sufficient numbers to give quick administration. What is more, the bank's managers have power to advance small amounts without any further authority. Of course, all questions of large advances are referred to the head office; but the Agricultural Bank is in quite a different position. It would never do for the Agricultural Bank to be administered in any other way than it is to-day in regard to the protection of the advances made from time to time. During the previous stage of the Bill certain criticisms were levelled at the bank in regard to delays in making advances, and especially in regard to sympathetic administration and the need for decentralisation in many cases. References were also made to the fact that to-day the bank had no power to do these things. Since then I have taken the trouble to go into the matter, and I find that all these things can be done without any further amendment of the Act. . . . As times goes on, we see the need of these things. I have hopes of seeing the Act administered in such a way that it will give satisfaction to those who come under the scope of its lending powers.

The Efficiency of the Bank.

The inspection staff at the present time is very small, and does not cover the amount of work which takes place from time to time. When a man makes application for a loan on the initiation of a new farm, the property has to be reported on. The inspector may have to go 50 miles, inspect the property, and then send his report to Brisbane. Consequently, there is a certain delay; but, notwithstanding the alleged delay which takes place, I was astonished to see the efficiency with which the work was carried out. It must not be thought that, because I am administering the affairs of the bank, I am unduly eulogising the members of the staff. The work with regard to inspection is carried out as expeditiously as possible, but in some cases the inspectors are very far apart, and it may be necessary to put on more inspectors from time to time with a view to getting the work done more quickly. It may be thought wise later on to establish a branch up north with greater authority. That is a phase of the question which struck me very forcibly while I was in the North. I really think that part of the State is too far away to get effective and quick administration. A man may apply for an advance of £100 to fell scrub. After the application is made the inspector has to go along and see that the scrub has been felled before the money is granted. That is another delay, showing conclusively that there is a lot in the argument for greater authority being exercised up north. If the inspection, for instance, cost 30s. per day, it would mean a considerable amount, because an inspector may have to make a dozen visits before the borrower's requirements are met. It will, therefore, be seen that the inspection of these properties is a very big item to the bank. When I mention that last year the inspection fees showed a loss of £7,801, and that the loss for eight or ten years past has been approximately the same, it shows what an expensive item it is. It also shows that, to get these inspections made rapidly, it would cost a great deal more. That is a phase of the question we have to take into consideration with regard to the expense of working the bank.

It is rather a peculiar position to be in; but I want hon. members to realise the position, so that they will not be harsh in their criticism of the Bill, because I am satisfied that matters can be greatly improved by decentralisation to a certain extent and putting on more inspectors, which we have power to do. As I have pointed out, the advances made by the bank are for the purpose of assisting primary production, and not for helping the man who has a really good security.

Risks that are Run.

At the present time the bank runs many risks. One of the faults we find is that the bank at times has lent too much. It has a very liberal margin—£1,700 is the maximum amount of advance now—but in many cases the bank has lent too much to individuals in order to secure the business; and that is the reason why local authorities have experienced a great deal of trouble in collecting their rates. In view of the very liberal advances made by the bank originally, no margin of security remains if there should be a depreciation of improvements and mortgaged properties have been abandoned. Anyone who goes on the land knows perfectly well that, if you do not get a good fall, you may get a heavy growth of noxious weeds the first year, and if you leave it till the second year it is worse than it was before the original falling of the scrub. You may have a large growth of noxious weeds and foreign grasses, which will depreciate the value of the security, showing the risk which the bank runs at the present time.

Local Authorities Protected.

The question then comes up whether the bank has played the game with local authorities. I think that the bank has done remarkably well, and has protected local authorities in every case where it was possible to do so. Of course, if they have overloaded the security or made too great an advance above the actual value of the security, the bank is unable to give the local authorities anything at all; but the bank has helped them in every way, and, if the bank is to be held responsible for all the rates owing on properties in its hands, then hon. members will understand that some local authorities may be inclined to use the bank to collect their rates. Such local authorities may say, ''These properties have the bank behind them. We will whip a bill into the bank and collect the rates from it.'' I have a case in point. There was a proposal in respect of a certain drainage area which I put before the Premier. In that district the local authorities would not father the scheme because they said that the bank to a certain extent would interfere with them in collecting the rates from the holders of mortgaged lands in the district. I had a complete return of the lands in respect of that area, and I found that the outstanding rates owing to that

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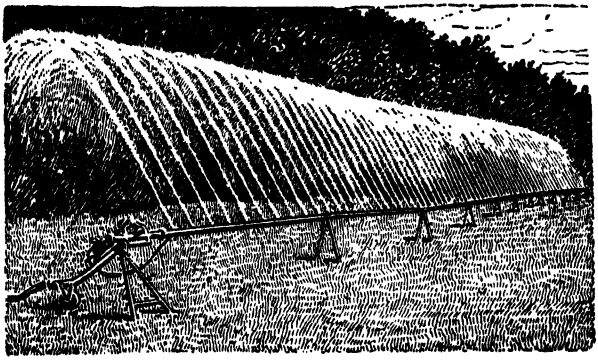

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local authority were greater on properties other than those in the hands of the bank than they were on the bank's properties. In other words, there was negligence on the part of the shire council in carrying out its work of collecting the rates. So hon. members will see what a grave danger would be created if the amendment were not made in the Act as the Bill proposes. In this connection hon. members must bear in mind that the Agricultural Bank helps local authorities in many ways. It requires new applicants to pay rates before receiving loans; it requires borrowers to pay accruing rates on advice from local authorities that rates are unpaid; it includes in the reserve price of properties being disposed of for default a sum sufficient to pay rates up to date; and it pays local authorities rates from the proceeds of the sale of such properties where such proceeds are sufficient to enable it to do so. I think hon. members will agree that local authorities get every protection from the Agricultural Bank; but, after all, the rates are really nothing in comparison with the other items for which the bank might be held responsible accordng to the judgment of the court, without the right of appeal to any court of law. It was generally thought that the power I now propose to take was in the original Act, and it was only through the case to which I have referred that the discovery was made as to the far-reaching effect of the burden which might be placed upon the bank.

Minor Matters.

The other clauses in the Bill are of minor importance. One of them deals with the appointment of the manager of the bank or other officer as a licensed auctioneer for the purpose of conducting sales at public auction, wherever possible, whilst the other is designed to grant relief from the payment of redemption instalments in necessitous cases. At present fresh securities have to be registered, which in some cases costs a considerable sum, and it is proposed by this Bill to do away with that procedure, and thus expedite the business of the bank and save the applicants further trouble and expense.

I do not think I can add anything more to what I said on the initiation of the Bill in Committee. I have given hon. members some idea of the principal clauses, and I have very much pleasure in moving—

"That the Bill be now read a second time."

THE SIMAR ROTOTILLER.

An interested gathering of farmers and experts followed the movements of a motor-driven implement, novel to most of them, which was demonstrated recently at the dairy farm of Mr. Stewart Conochie, on the Sherwood road, Oxley Creek. As long ago as 1924, Mr. A. C. Elphinstone, while on a visit to the Wembley Exhibition, was so much attracted by what he saw of this implement that he took occasion to run across to the Continent for the purpose of visiting the factory in Switzerland where it was being manufactured. He has now secured for Elphinstones Limited the sole distributing rights in Queensland. The machine domonstrated was what is known as the 10 h.p. size. Essentially it consists of an engine which can be worked either on petrol or kerosene, carried on a pair of broad-tyred wheels and directed by means of a suitable pair of handles controlled by the operator who walks behind. The engine drives a shaft or "miller" on which are mounted suitable tines revolving at a rapid rate, and which in their impact upon the soil tear the apparatus forward at a pace practically as fast as the man can walk. Three types of tine are supplied suitable to different classes of work. The engine power can also be made available for any class of work within its h.p. capacity.

The land on which the demonstration was given was old paspalum pasture, dry, and hard-trampled by stock. The matted growth was easily torn up by the rototiller. Work was shown also on cultivated land, dry and lumpy, in which the machine prepared an excellent seedbed at a single operation. Experienced farmers considered that it would be excellent for renovating either pastures or old lucerne fields, loosening the soil without destroying the roots, and that it would be most useful for working in orchards or market gardens. The fact that the controller of the machine would have to walk was regarded by some as an obstacle in the way of using it in cane cultivation, but by others it was thought that it would prove exceedingly useful in working up and down the cane rows in the earlier stages, loosening the soil and eradicating weeds.

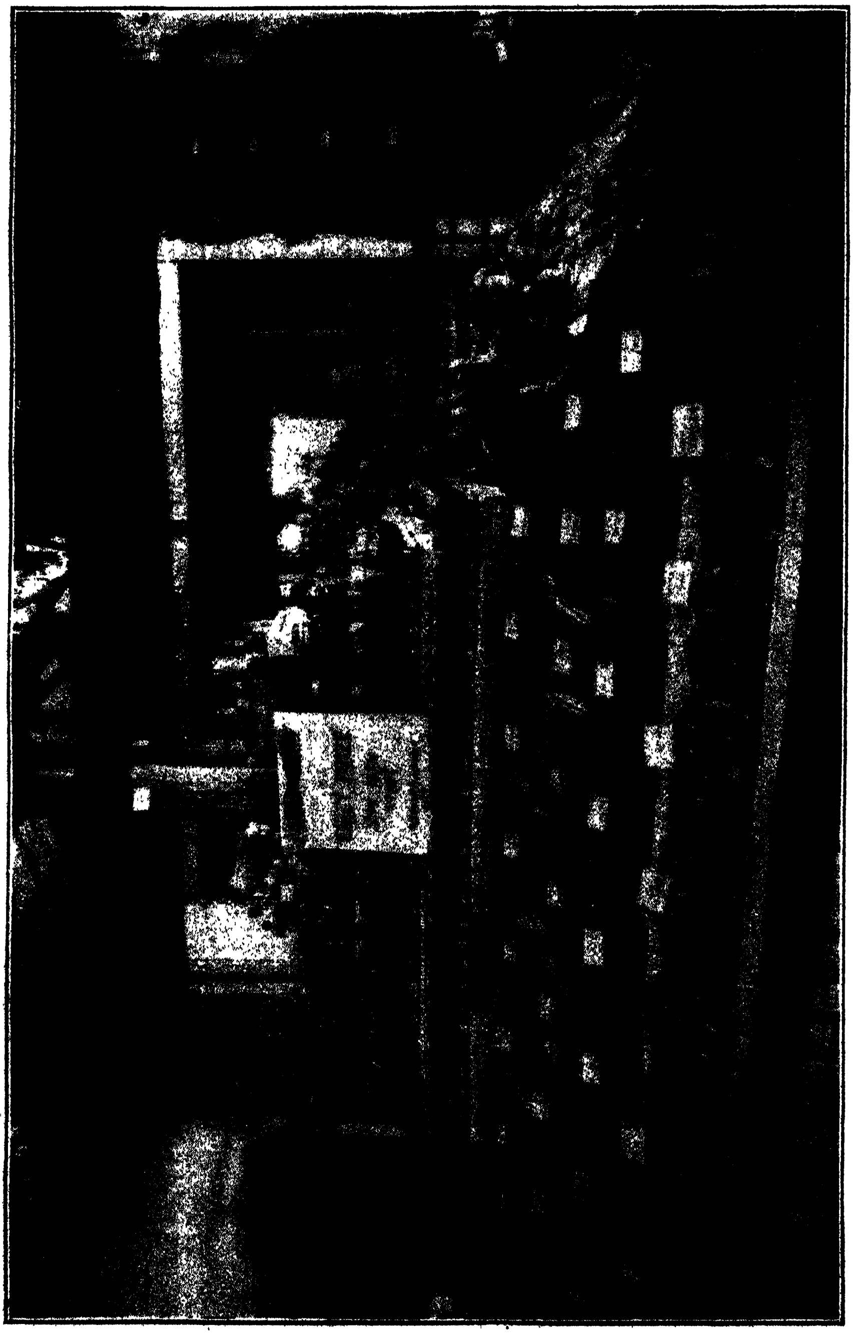

Plate 137.—First Prize One Farm Display, Exhibited by W. D. Ponton, Tuggerah. Royal National Show, 1929.

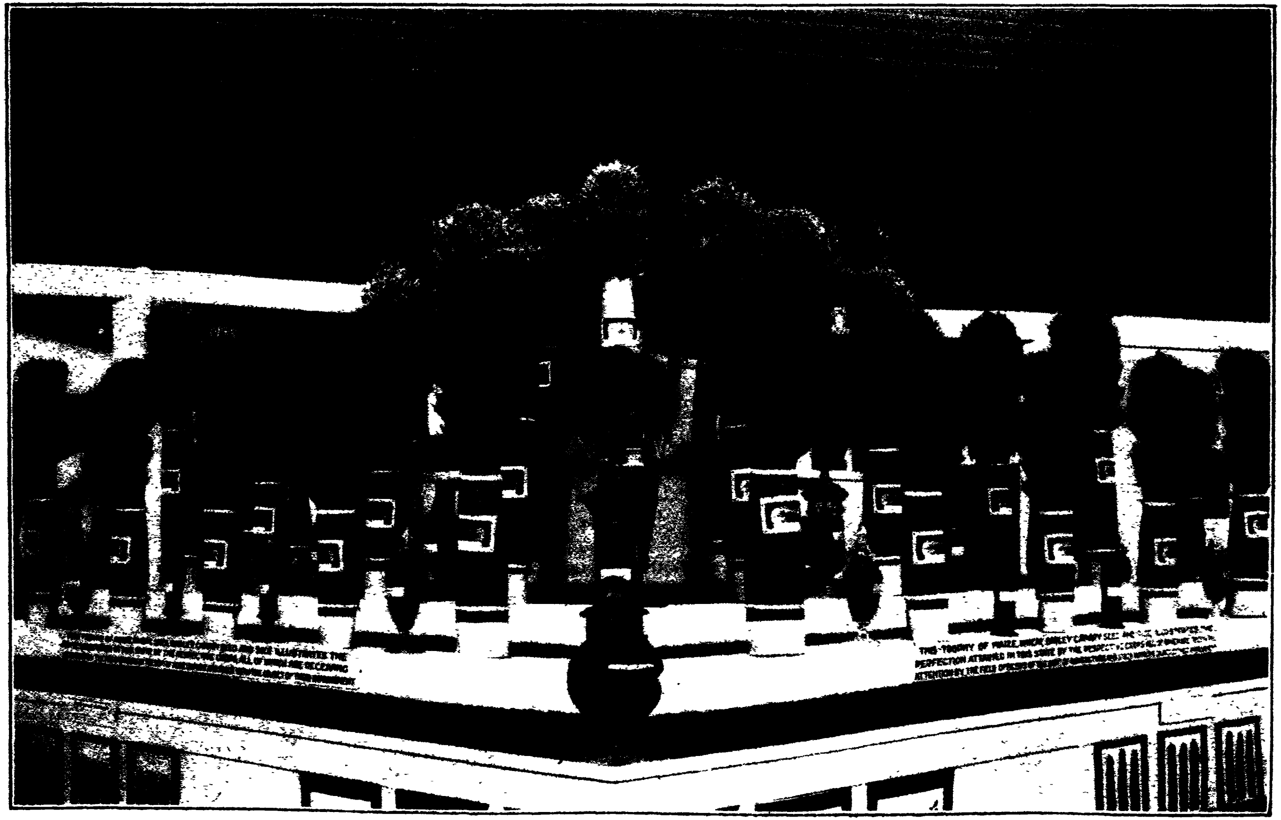

Plate 138.—Science assists in the Evolution of New Cereals.

The highly technical work of wheat-breeding for Queensland conditions of Summer rainfall was well illustrated by this trophy at the Brisbane Exhibition.

IN MEMORIAM—HENRI A. TARDENT.

By the death on Thursday, 5th September, at his home, "Ormonts," Wynnum, of Henry A. Tardent, Queensland lost a citizen of the best and most patriotic type. Born in Switzerland seventy-seven years ago, the late H. A. Tardent, though practically self-educated, proved himself a brilliant scholar, with a special gift for languages. At the age of sixteen he went to Poland as a teacher of French. Later he went to Russia, and graduated at Odessa University as Professor of the French and German languages. In 1887 he migrated to Queensland. For some years he was at Roma, where he entered into wine-making and general farming. Later he became the first manager of the Westbrook and Biggenden State farms. Afterwards and almost until the end he followed up journalism and literature, serving for some years on the staff of the Brisbane "Daily Standard," and contributing numerous articles to "The Worker" as well as to other papers. He was the author of many treatises, biographies, and essays. Besides his contributions to Australian papers, he was this country's correspondent to the Paris "L'Illustration," the "Revue," of Geneva, and the "Gazette de Lausanne." His published works (some of them prize essays) include biographies of Richard John Randall (Queensland artist), George Essex Evans (Queensland poet), and Mrs. Ellis Rowan, whose paintings of Australian wild flowers are of the highest order of artistic excellence. He also wrote "Reflections on an Australian Literature," "The "Influence of Poetry on Modern Life," "Art and Its Value as a National Asset," "The Functions of the State in Relation to its Commercial Life," "Arbitration v. War for the Settlement of International Disputes," "The Future Development of Western Queensland," "Science as Applied to Agriculture," and "Australia's Contribution to the World War," besides numerous works in French on various phases of Australian life and its development. He was some time contributor to this Journal. His writings in French and Swiss publications, marked as they were by a high literary tone, did much to bring Australia, and particularly Queensland, before the eyes of large and new audiences in Europe, with results wholly beneficial to the country's reputation that are difficult to appraise. An article by him on "The Birth of Canberra," starred in the Paris "L'Illustration" with appropriate photographs, was a brilliant example of the best in high-class journalism, and probably proved one of the most effective advertisements the Commonwealth has received in any country outside of Britain itself. As a crowning and fitting climax to his numerous contributions to French papers, work regarding which but few Australians had any knowledge, he was awarded in March by the French Government the distinction of O.A. (Officier d' Academie) for services rendered to literature, science, and art.

The funeral to Bulimba Cemetery was largely attended, those present including the Consuls of Switzerland and France, and representatives of the Authors and Artists' Association, Royal Geographical Society, Alliance Francaise of Brisbane, various Labour organisations, different departments of the public service, and other bodies.

Among those gathered around the graveside were many—men of culture from our universities, men of science, men of letters, and men of affairs—who knew that the sad ceremony in which they were taking part was no ordinary one, but that the casket being committed to the earth in their presence contained the remains of a good Australian—one whose work and worth, recognised during his life by an ever-growing circle, will be appreciated more and more as the future unfolds. For Australian culture, still in its formative stage, owes a debt to Henri Tardent—its sponsor and champion, its guide, philosopher, and friend. When it is rightly understood, when Australian art, letters, science, music, and all the various forms of national self-expression in their highest come into their own, Henri Tardent will be accorded a place in the history of its development that his pioneering labours on its behalf and his unbounded faith in its future have earned for him.

With his possession of high intellectual qualities, wide scholarship, and culture in many branches of study, Henri Tardent was one of those rare souls who, by his sunny nature and overflowing good will, endeared himself to those fortunate enough to be numbered among his intimates.

CLIMATOLOGICAL TABLE—AUGUST, 1929.

SUPPLIED BY THE COMMONWEALTH OF AUSTRALIA, METEOROLOGICAL BUREAU, BRISBANE.

Districts and Stations.	Atmospheric Pressure. Mean at 9 a.m.	SHADE TEMPERATURE.						RAINFALL.	
		Means.		EXTREMES.				Total.	Wet Days.
		Max.	Min.	Max.	Date.	Min.	Date.		
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Points.	
Cooktown	30·05	80	69	83	14, 24	59	25, 2	43	7
Herberton	..	73	51	82	23	34	25	6	1
Rockhampton	30·14	77	54	87	22	42	25	5	3
Brisbane	30·17	72	51	83	22	42	3	95	4
Darling Downs.									
Dalby	30·17	73	41	83	30	30	7, 8	29	5
Stanthorpe	..	62	34	74	16	24	3, 7	113	7
Toowoomba	..	66	42	78	16	26	8	69	5
Mid-interior.									
Georgetown	30·02	85	53	90	13, 14	40	2	0	..
Longreach	30·10	81	48	93	22	36	25	0	..
Mitchell	30·15	72	41	86	15	26	1	39	3
Western.									
Burketown	30·04	83	58	91	23	49	3, 4	0	..
Boulia	30·08	80	51	93	14	40	8	0	..
Thargomindah	30·13	71	46	90	15	33	12	10	2

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF AUGUST IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING AUGUST, 1929, AND 1928, FOR COMPARISON.

Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.	
	Aug.	No. of Years' Records.	Aug., 1929.	Aug., 1928.
North Coast.	In.		In.	In.
Atherton	0·84	28	0·26	1·08
Cairns	1·74	47	0·84	0·59
Cardwell	1·30	57	0·24	0·98
Cooktown	1·29	53	0·43	0·02
Herberton	0·64	42	0·06	0·12
Ingham	1·51	37	0·47	0·67
Innisfail	5·10	48	1·85	3·78
Mossman	1·29	16	0·33	0·14
Townsville	0·53	58	0	0
Central Coast.				
Ayr	0·61	42	0	0
Bowen	0·67	58	0·27	0
Charters Towers ..	0·58	47	0	0
Mackay	1·08	58	0·19	0·17
Proserpine	1·39	26	0·74	0·70
St. Lawrence.. ..	0·87	58	0	0·12
South Coast.				
Biggenden	1·07	30	1·42	0·35
Bundaberg	1·30	46	0·39	0·25
Brisbane		78	0·95	1·05
Caboolture	1·56	42	1·00	0·98
Childers	1·22	34	0·82	0·28
Crohamhurst ..	2·22	36	1·25	1·07
Esk	1·54	42	1·43	0·70
Gayndah	1·18	58	0·69	0
Gympie	1·76	59	1·21	0·49
Kilkivan	1·45	50	1·80	0·30
Maryborough ..	1·68	57	0·70	0·42
South Coast—continued:				
Nambour	1·89	33	0·07	1·05
Nanango	1·35	47	0·32	0
Rockhampton ..	0·98	42	0·05	0·05
Woodford	1·75	42	1·06	0·73
Darling Downs.				
Dalby	1·22	59	0·29	0
Emu Vale	1·18	33	0·77	0·21
Jimbour	1·21	41	0·64	0
Miles	1·17	44	0·44	0
Stanthorpe.. ..	1·82	56	1·13	0·37
Toowoomba ..	1·71	57	0·69	0·90
Warwick	1·53	64	0·68	0·23
Maranoa.				
Roma .. .	0·97	55	0·21	0
State Farms, &c.				
Bungeworgorai ..	0·90	15	0·19	0
Gatton College ..	1·19	30	0·02	0·63
Gindie	0·71	30	0·15	0
Hermitage	1·33	23	..	0·35
Kairi	0·95	15	..	1·11
Mackay Sugar Experiment Station ..	0·95	32	0·24	0·05
Warren	0·91	14	..	..

GEORGE G. BOND, Divisional Meteorologist.

PLATE 139.—CITRUS AND OTHER FRUITS FROM THE BLACKALL RANGE. MONTVILLE DISTRICT FRUIT EXHIBIT AT THE BRISBANE SHOW, 1929.

Plate 140.—Food for the Million.
A section of the Meat Industry Exhibit, Brisbane Show, 1929.

Plate 141.—By-Products of the Meat Industry illustrated impressively the Interlocking of Primary and Secondary Industry at the recent Brisbane Show.

RURAL LIFE IN OTHER LANDS—V.

By the EDITOR.*

JOURNEYINGS IN GERMANY.

Our first halt across the Border was at Aix-la-Chapelle—called Aachen by the Germans—Charlemagne's old headquarters and a city of ancient historical importance centred in a fertile basin surrounded by gently sloping hills. Though retaining its mediæval features it is now quite a modern city with fine, broad streets and attractive shops. Manufacturing is its main supporting industry and, significantly enough, smoke was pouring in dense volumes from every factory chimney. From there the way went on past the Castle of Frankenberg, through the Nurmer tunnel and the Reichsbusch Wood out into a picturesque district of busy industry based on iron and coal. Then came Eschweiler, set in a pretty valley, and then Duren, another very active centre. The line from there ran out on to a fertile plain studded with farmhouses and factories. The twin spires of the great Cathedral of Cologne, the square tower and tapering spire of St. Martin's, and the tower of the Town Hall soon topped the horizon, and before long we were rumbling over the Rhine getting our first sight of one of Europe's most famous waterways.

Cologne and its Cathedral.

Cologne is a great city with treasures of art, monuments of beauty, quaint houses, and large modern stores. The interior beauty of its wonderful cathedral, the largest Gothic church in Northern Europe, covering an area of 91,000 square feet and accommodating 24,000 persons, left an ineffaceable impression. Its massive spires merging into one huge mountain of fretted stone make an historic landmark around which the traditions of more than six centuries have gathered, and which is still a centre of tender sentiment to the people of the Rhine. This great cathedral, like that of Amiens, dominated its subject city in the days of old and it still presides over Cologne, remaining a marvel of ancient architecture among many modern structures of far less grace and charm.

While the citizens of other days set themselves the task of translating stone into terms of spiritual beauty, those of the present age are busy building for comfort, pleasure, and illusion. In principle and effect their efforts differ diametrically—the difference of the spiritually beautiful and the materially excellent.

In Cologne, as elsewhere in Germany at that time, though militarism and war had been revealed in all their stark insanity, one encountered in every public place the forbidding frown of an arrogant imperialism expressed in grotesquely graven monuments, and now happily submerging rapidly in the rising tide of an educated and disillusioned democracy.

Further down the Rhine towards the Border of Holland is Dusseldorf, with its beautiful public gardens, fountains, and boulevards. It calls itself the city of arts and the muses. We knew it as the birthplace of Heine. Thackeray and Bulwer Lytton had already made us familiar with Rhineland celebrated in a hundred romances; around every rock and rise legends have gathered making it classic ground.

Co-operation in Germany.

The success or otherwise of agricultural co-operation in Germany was one of the main subjects of our inquiry, and we will forget history and scenery for awhile and consider some post-war developments in this connection. In the year of my visit there was an unprecedented increase of new co-operative societies, a total of 3,421 being reached, showing, if one omits those established in areas removed from German jurisdiction under the Peace Treaty, a net increase of 676 societies on the previous year's figures. The total number of agricultural co-operative societies had reached the imposing total of 31,521—that is to say, 81 per cent. of the total registered co-operative societies. More than four-fifths then of German co-operative societies were agricultural co-operative organisations. These figures show the enormous grip the co-operative idea has on the minds of the progressive German farmer. Their membership, estimated on the basis of the averages supplied by the statistics of the National Federation, was at least 3,000,000. Agricultural co-operation thus represents a form of rural organisation far superior to any other in Germany. As compared with the total population, there was one agricultural co-operative society for every 1,868 inhabitants, and as compared with the total productive area, one co-operative society for every, say, 2,000 acres of land. Of these societies 97.4 per cent. were affiliated to co-operative federations, and of these 66 per cent. belonged to the National Federation of German Co-operative Societies and the balance was divided among other federations. The number of central co-operative societies (central banks and central co-operative societies for purchase and sale) was eighty-six.

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* In a radio address from 4QG.

The co-operative banks, on figures, were very successful—figures which, in view of currency depreciation at the time of my inquiry, there would be no use now in quoting.

The co-operative societies I have mentioned included organisations for the purchase of agricultural requisites (fertilisers, stock foods, seeds, and machines, and other commodities).

The state of the exchange and the consequent difficulties of commercial relations with other countries, together with trading restrictions, industrial troubles, and transport difficulties, had, of course, a depreciating influence on the volume of business done. The economic situation during the war had given a marked impetus to co-operative selling, and also in the years after the war, in comparison with the pre-war period.

In the year I was there many new rural banks were established, 69 were dissolved, and 1,621 alienated as a consequence of the Treaty. Of these banks, 90.4 per cent. were on the basis of unlimited liability and the balance on more or less limited liability. Financially, however, the balance-sheets of these concerns showed large losses, which were put down to the great fall in the value of the securities held resulting from the fall in the war loan quotations. There were, possibly, other contributing causes.

Of the co-operative societies for purchase and sale of farm requisites and produce, 84 showed neither profit nor loss, 2,166 registered profits, and 240 showed a loss. Measured in marks the net profit was immense.

Of the co-operative dairy societies, 292 had neither profits nor losses, 1,189 showed a profit, and 191 losses. Of the other co-operative societies, most of these, according to the nature of their service, are on a limited liability basis, but on account of the currency and economic difficulties then prevailing it was difficult to judge their exact position.

Losses occurred in the case of co-operative societies for distilling, motor services, brick and some other manufacturing enterprises. Dehydration societies, livestock selling agencies, fish-selling businesses, ploughing and thrashing societies and similar organisations showed varying results. It must be remembered, of course, that these observations apply only to a year when industrial chaos was a normal European condition.

Another Rural Exodus.

According to latest official reports on the economic situation in Germany, agriculture, however, in spite of all the economic devices to improve the lot of the man on the land, is, as in every other agricultural country in the world, far from satisfactory. The unbalanced economic position in South-West Germany particularly had led to a situation under which farmers, in many instances, were unable to make a living. The result had been a large emigration of farmers, limited only by the immigration restrictions of the countries in which they sought domicile. In 1871 the rural population of Germany was 64 per cent. of the whole population, while the present percentage is said to be only 35. These figures go to show that the rural exodus is common to every agricultural country. The remedy lies to some extent in making country life more payable and attractive.

National Influence of Co-operative Societies.

In Germany the co-operative movement has been successful, to some extent, in stemming the tide of the general cityward trek. They certainly have been a great influence for the national wellbeing. To them must be credited much of the progress in the economic welfare of the country people of Germany in recent years, and their general influence on the improvement of rural conditions has been on every hand sound, instructive, and constructive. To the German farmer it has been a source of support, guidance, and enlightenment, and so he appreciates its value accordingly.

A FARMER'S OPINION OF THE JOURNAL.

A Gayndah farmer writes (7th *September*, 1929):—*I take this opportunity of expressing my high opinion of the "Queensland Agricultural Journal." It provides valuable and expert information which no intelligent producer can fail to enjoy and profit by."*

PLATE 142.—ROSIE 4TH OF GREYLEIGH, CHAMPION BUTTER FAT TEST COW. ROYAL NATIONAL SHOW, 1929.

Plate 143.—"Beryl's Pride of Crescent Farm" (J. C. Mann), Champion Ayrshire Cow. Royal National Show, 1929.

PLATE 144.—MINNAMURRA CHERUBINE (A. S. COOK), CHAMPION GUERNSEY COW. ROYAL NATIONAL SHOW, 1929.

Plate 145.—College Princess Pontiac (Hickey and Son), Champion Friesian Cow: Royal National Show, 1929.

PLATE 146.—"OXFORD GOLDEN BUTTERCUP" (BURTON & SONS), CHAMPION JERSEY COW, ROYAL NATIONAL SHOW, 1929.

Plate 147.—"Favourite II. of Railway View" (A. T. Waters), Champion I.M.S. Cow, Royal National Show, 1929.

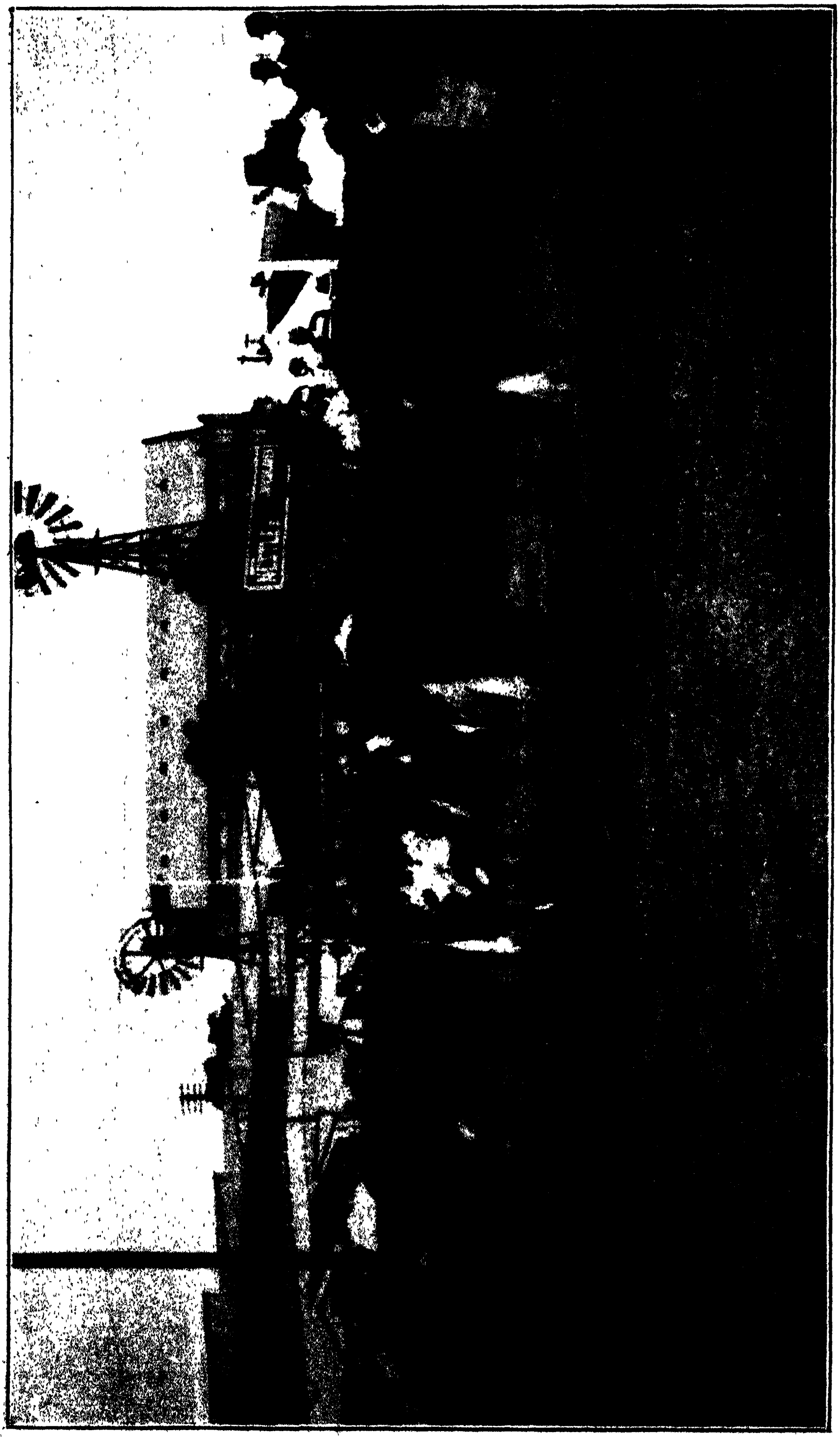


Plate 148.—Illawarra Milking Shorthorns Paraded for Judgment, Royal National Show, 1929.

ABSTRACTS AND REVIEWS.

Pig Breeders' Annual for 1929-30.

(Year Book of the National Pig Breeders' Association, vol. 9.
N.P.B.A., London. 3s. 6d. post free).

The current issue of the Pig Breeders' Annual is as informative and as comprehensive in its survey of pig breeding, feeding, and management in all parts of the world as the eight previous issues of this publication; in fact, volume 9 is even more informative. It is well illustrated, and is a useful publication for Australian pig farmers.

In a breezily written foreword, Viscount Folkestone, Vice-chairman of the British Pig Industry Council, stresses the importance of the work undertaken by the National Pig Breeders' Association of England, under whose auspices the Annual is issued, and emphasises that an organisation of the nature of the N.P.B.A., though primarily a pedigree pig society, covers a much wider field in its activities by taking the lead in investigating those wider questions of organisation, marketing, and scientific research the value of which is even greater to the non-pedigree commercial producer than it is to the pedigree breeder.

Lord Folkestone informs readers of many of the difficulties through which the British pig farmer has been passing during the past two years, a period characterised by unprofitable and unsatisfactory prices. He is, however, optimistic enough to believe that the unprofitable period is giving way to a profitable one, and it seems time, he thinks, to get the various organisations on a sound footing so that pig breeders shall be in a position when a lean time comes again to counter to some extent the forces that work against them.

Contributors.

Mr. John Hammond, M.A., of the School of Agriculture, Cambridge, has an informative article on "Fertility in Pigs" which breeders everywhere would do well to study carefully. This article deals in detail with the whole subject of reproduction and indicates ways by means of which larger and better litters may be obtained and the general fertility of the herd improved. "Pig Testing and Litter Recording in Sweden" is dealt with in an interesting way by Sigfrid Larsson, a prominent authority in that country, where pig raising is coming to the fore in quite a remarkable way. An interesting survey of the "By-Products of the Pig Industry" is contributed by Mr. F. W. Jackson, A.C.G.I., B.Sc., A.I.C., in which detailed reference is made to both the edible and inedible products of the pigs. Principal Charles Crowther, M.A., contributes a breezy report of the "Work of the Harper Adams Pig Experimental Station" and informs readers of the various experiments in progress at the institution. "Mendelism" is dealt with by M. S. Pease, M.A., of the Small Animal Breeding Institute at the Cambridge University, while "Pig Production in America" covers a wider field and is contributed by Grady Sellars, B.S. Agri., a field agent of the Kentucky Agricultural Experiment Station.

A very important article on "Tuberculosis in Swine" by Major C. J. Saunders, D.S.O., B.V.Sc., M.R.C.V.S., will be read with intense interest by farmers, for this is a subject on which every stockman needs to be fully informed.

An article dealing with "Characteristics of the Berkshire Breed" by Mr. John R. Baker, M.A., D.Phil., will be of especial interest to Berkshire fanciers, while all pig raisers will be interested in Mr. R. McG. Carshaw's review of "Profits and Losses on Mixed Arable Farms." "Fruit Culture and the Pig" touches on another aspect of pig raising, and is dealt with by the Horticultural Superintendent of the Norfolk County Council. K. D. Downham's article on "Some External Parasites of Swine" is of interest, as also is A. N. Duckham's review of the "Interpretation of Pig Recording Results." Mr. Duckham is associated with the Animal Nutrition Institute of Cambridge, where much useful work is being carried out.

To Australian Pig Raisers, Mr. E. J. Shelton's review of "Breeds of Pigs in Australia" is of especial interest. This article is illustrated with photographs of a number of championship winners, and deals with the several breeds in this country. "Rate of Production in Pork and Bacon" by James Wilson, M.A., B.Sc., gives much interesting information, and this section carries some excellent illustrations of prominent prizewinning animals in Great Britain. "Pig Breeding in Poland" informs breeders of the progress of the industry in that country, while from the trade point of view the British pig industry is discussed in an article, "Prices, Distribution, and the Pig Industry," by Montague Fordham, the Secretary of the Rural Reconstruction Association. "Pig Breeding in the Soviet Union" indicates that there are many countries throughout the world where farmers are awakening to the possibilities of this industry, and indicates that we need to be on the move if we hope to obtain a permanent footing in the markets of the world with our pork products. Much tabular information and excellent illustrations complete the best 3s. 6d. worth offering to the man who is interested in pigs for profit.

The secretary of the National Pig Breeders' Association, Mr. Alec Hobson, 92 Gower street, London, W.C. 1, will be pleased to communicate with breeders in any part of the world and to supply any further information required. Copies may be ordered through Mr. E. J. Shelton, Senior Instructor in Pig Raising.

"Sugar-Cane and its Culture (1928)."

(F. S. EARLE, Chapman and Hall, Covent Garden, London, W.C.2, and John Wiley and Sons, Inc., New York. 22s. 6d. net.)

This book was the final effort of the recently deceased F. S. Earle, for many years the recognised leader of the West Indian school of scientific sugar-cane agriculturists, and probably the world authority on sugar-cane varieties.

Earle was an eminently practical man, and the book is written in a simple direct style which should appeal to all practical agriculturists. As he remarks in the preface, "Frankly the atmosphere of the book is that of the canefield rather than that of the research laboratory."

The book is divided into two parts. Part I. deals with the history of sugar-cane: its propagation, structure, pests, and diseases; while Part II. deals with the cultivation of sugar-cane. The chapters on the diseases and insect pests are very wide in their scope, and in the case of the chapter on diseases the attached bibliography is very comprehensive and valuable. Unfortunately, the descriptions of the symptoms of the diseases are not as full as they should be. Mosaic disease and the root rot complex are given particular attention, and the essays on these two subjects are particularly informative, though there are some inaccuracies in dealing with those varieties and diseases which are more or less confined to Australasia. Part I. also contains a key for the identification of all the important present-day varieties of cane, together with a description of each variety and its agricultural characteristics.

In the section devoted to the cultivation of sugar-cane, one chapter deals with the classification of soils in a very general way, and chapters are devoted to the preparation of the land and systems of planting. These subjects are discussed from the practical rather than the scientific viewpoint, and should prove very useful to planters in the West Indies.

There are two appendices. Appendix I. contains an annotated list of all the varieties which have been recorded up to the present time, while Appendix II. gives a brief summary of the main features of the sugar-cane industry in the more important sugar-producing countries.

The book will, no doubt, become a standard reference book on the subject of sugar-cane varieties, and the treatment of this subject is its outstanding feature. It is a work that can be well recommended to both the farmer and scientific agriculturist. Our copy is from the publishers.—A.F.B.

PIONEER DROVERS.

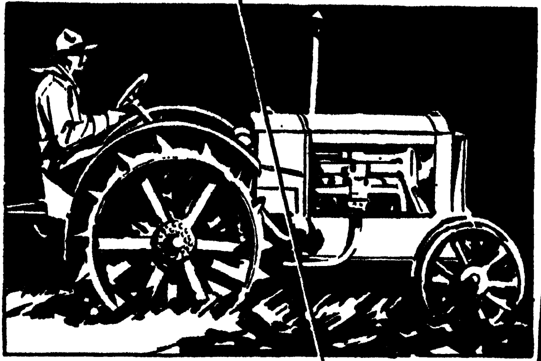
Mr. W. H. Rudd, junior, of Kingsborough, Aramac, Queensland, in a letter to the editor of the "Pastoral Review" (September) comments as follows on an article entitled "Pioneer Drovers" in the July issue of the "Review," and which was reprinted in this journal:—

"In July issue Mr. S. E. Pearson, whose writings I enjoy each month, is not right when he says, under "Pioneer Drovers," that Walter Rose has been keeping a hotel in Cloncurry. That is about the last job he would tackle. Latest news I heard of him this year was superintending a bangtail muster on Avon Downs—the sort of job he knows. The "Bed of Roses" in Cloncurry is kept in order by Walter Rose, a nephew of old Walter.

"Mr. Pearson has also confused Blake Miller, of Undilla, with the late Jack Miller. It was Kidman and Miller, of Austral, but "Johnnycake" Jack Miller (who passed away a couple of years ago in Urandangie)—not Blake.

"Blake was on the Murranji track, and they married two sisters, Misses McCaw, of Urandangie—also were both with Kidman—so it is an easy mistake."

WORK



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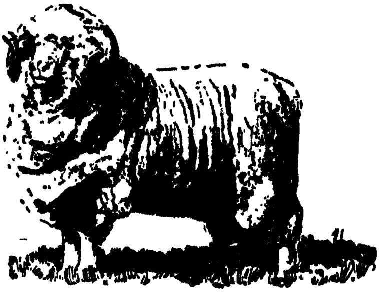

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NOTES ON THE SHEEP BLOWFLY.

By J. CAREW, Senior Instructor in Sheep and Wool.

When investigating the blowfly trouble in the Central District recently, I found that most of the graziers were relying on crutching and dressing, or shearing the sheep in order that they would be in a more suitable state to resist the fly.

The fly is usually attracted to the sheep by moisture, and by shearing or crutching the moist or dirty wool is removed, therefore the sheep are not so attractive to the pest.

In many cases, however, it was found that from one to three weeks after crutching the sheep were blown to the extent of from 10 to 20 per cent. of given mobs. It would therefore appear that crutching did not give the amount of protection desired. Shearing is an advantage, as the maggots do not get all the protection they require; still, cases were met with where three weeks after shearing the flies were again attacking the sheep.

Those who were in charge of large flocks and depended on jetting as a protection for the sheep were the men who were emphatic about the advantages gained by this method.

In dealing with the fly, the most effective method should be adopted, for, whatever the treatment, it is a cumbersome and costly business.

Cases were met with where those in charge expressed themselves as being quite confident that jetting is the best means of coping with the trouble; in fact, the opinion is widely held that it is the only means that could be relied on to protect large flocks. This is also the opinion of the Committee of Investigators who conducted the experiments under the Council of Science and Industry at Dalmally; and they considered that jetting with a solution consisting of 7 lb. arsenic with an equal quantity of carbonate of soda to 100 gallons of water gave 90 per cent. protection for three months.

Weather is an important factor, but it is regarded that the quantity of arsenic in the solution jetted into the breach is the ingredient giving the protection. Many dip mixtures are on the market, those containing arsenic being the most suitable.

All who are getting satisfactory results from jetting are satisfied that the secret of success is that the mixture must be sufficiently strong to kill the maggots, and that it must be properly jetted with sufficient force to penetrate to the skin in sufficient spread around the breach and tail, as mostly all attacks are confined to these parts.

The pressure necessary varies according to the length of wool, from 160 lb. per square inch for ten months' growth to 60 lb. per square inch for crutched or shorn sheep. The longer the wool, the greater the amount of solution retained, thus giving a greater amount of protection to the sheep.

For a small flock of 500 sheep up to 5,000, a hand-pressure pump may be used, but for larger numbers the power plant is the most suitable. Among those who had experience with all methods and now consider the jetting as giving the greatest amount of protection is Mr. B. Barton, manager, Baratria Station, Chorregon, Winton line, who states that, provided the jetting mixture is correct and properly applied, he has every confidence in its being the best means of protecting large flocks of sheep.

There are erected on Baratria Station three elevated races, which are the cheapest and simplest I have seen in use, allowing for quick handling with a minimum of labour, and quite as efficient as any other style for thorough application. It consists of an elevated race 3 feet 6 inches above ground at the highest point, just ahead of where the jetting takes place. It is fitted with two sliding and one swinging gate. The swing gate forms part of the race. When the sheep to be jetted passes this swinging gate the sliding gate is pushed across the race to hold it while being jetted. The man feeding the jetter draws the swing gate across the race by means of a rope attached to the top of the gate and led back along the race through a pulley at the opposite side. When the sheep is jetted the operator opens the sliding gate by means of a long lever, and also the swing gate; in this way the jetted sheep is followed by its successor, the sliding gate holding it in position.

The race is 16 inches wide, and is floored with 3 inches by 1¼ inch battens spaced ¾ inch apart. The uprights may be of bush timber, but 3 inch by 2 inch sawn timber is most convenient for working, and can also be used to carry the cross battens in the runway. The race is 50 feet in length, including the ramp, which is 14 feet in length and tapers from 6 feet in the yard to 16 inches at the entrance of runway.

While I was present Mr. Barton jetted 180 sheep in twenty-five minutes, using 50 gallons of mixture. Four men were keeping the sheep up to him.

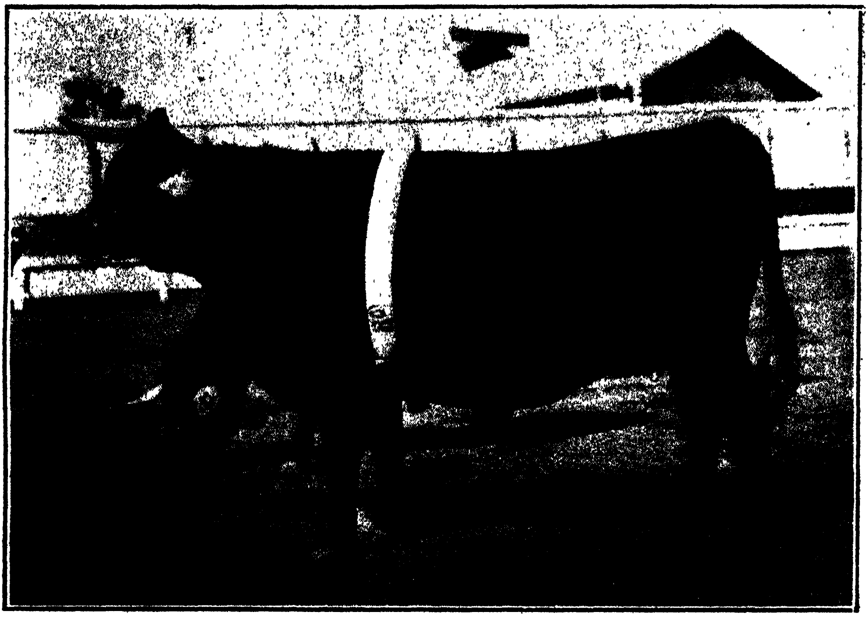

Plate 149.—Gypsy Countess 44th (R. A. Howell), Champion Devon Cow. Royal National Show, 1929.

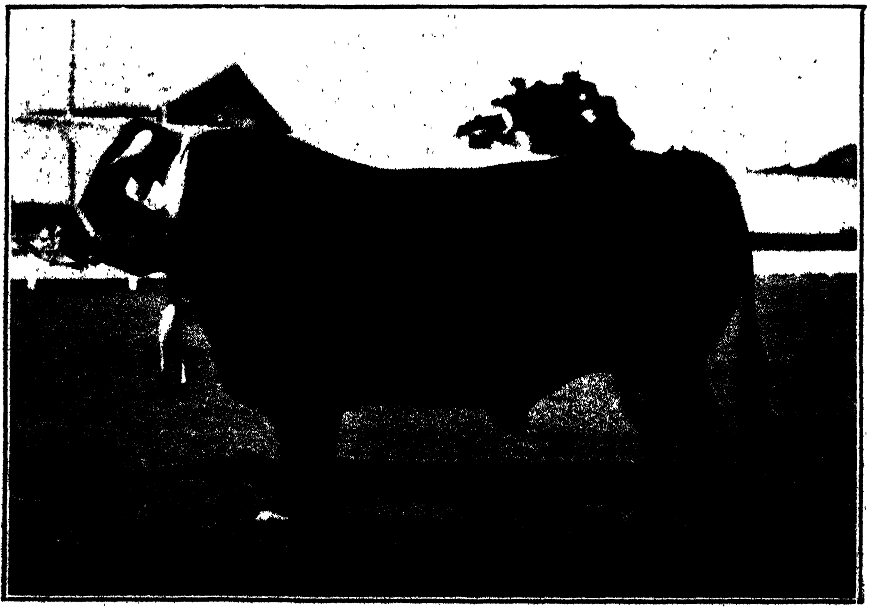

Plate 150.—Baronet (R. A. Howell), Champion Devon Bull. Royal National Show, 1929.

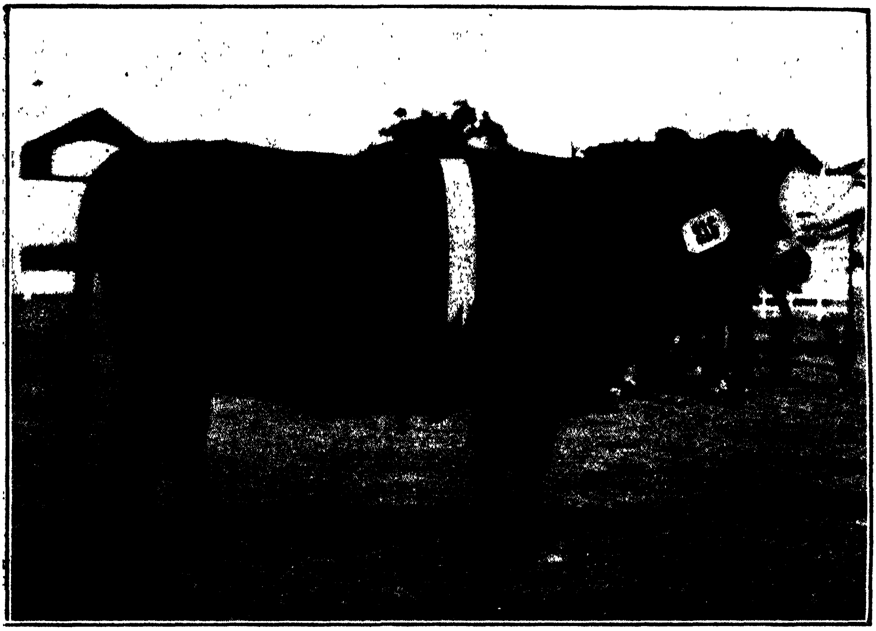

Plate 151.—Highland Maid of Talgai (G. C. Clark), Champion Poled Angus Cow. Royal National Show, 1929.

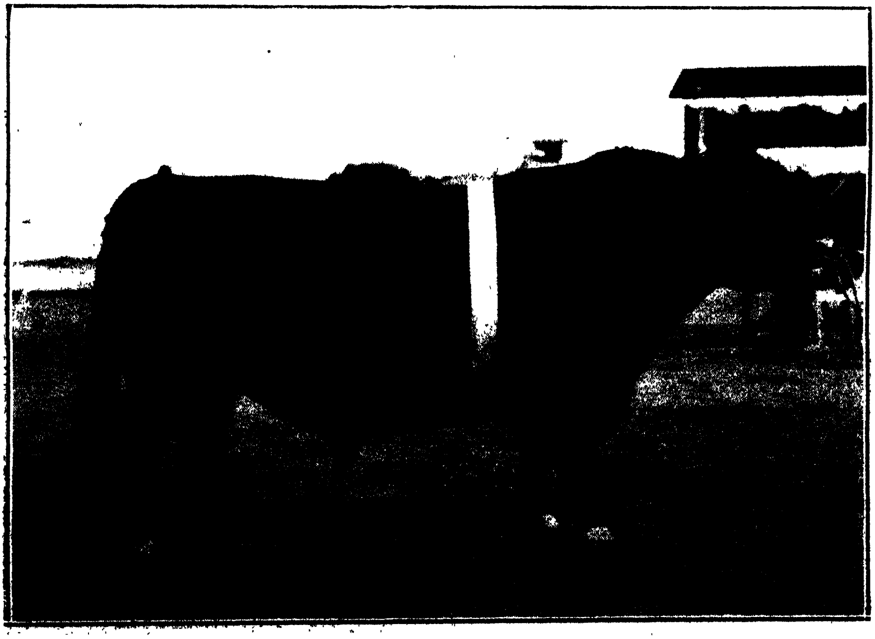

Plate 152.—Trooper Burgess (I. M. Newman), Champion Poled Angus Bull. Royal National Show, 1929.

PLATE 153.—PRINCESS MARY (MORRIS AND REYNOLDS), CHAMPION HEREFORD COW. ROYAL NATIONAL SHOW, 1929.

PLATE 154.—HOBARTVILLE FOREST KING (S. N. INNES), CHAMPION HEREFORD BULL. ROYAL NATIONAL SHOW, 1929.

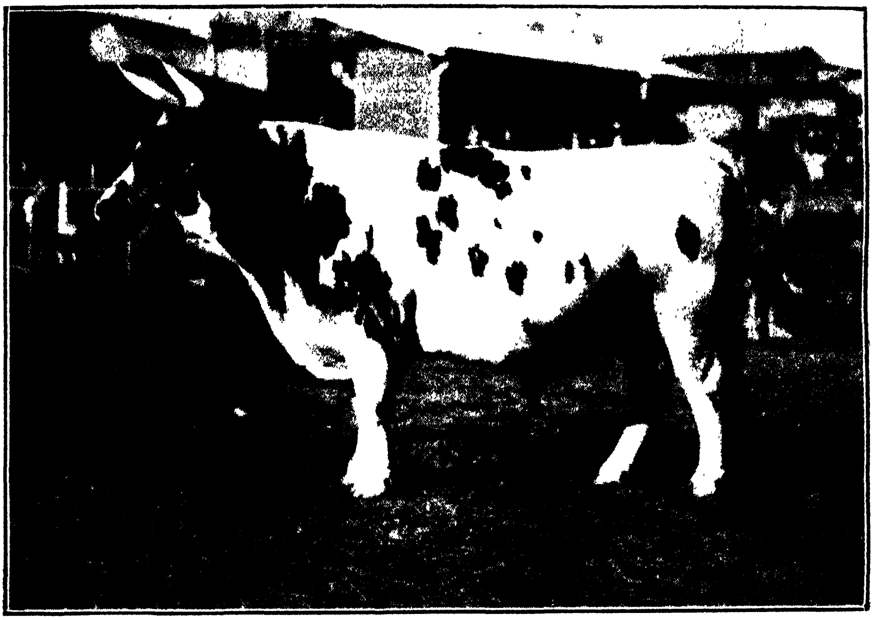

Plate 155.—Claredale Billy, Champion Ayrshire Bull. Royal National Show, 1929.

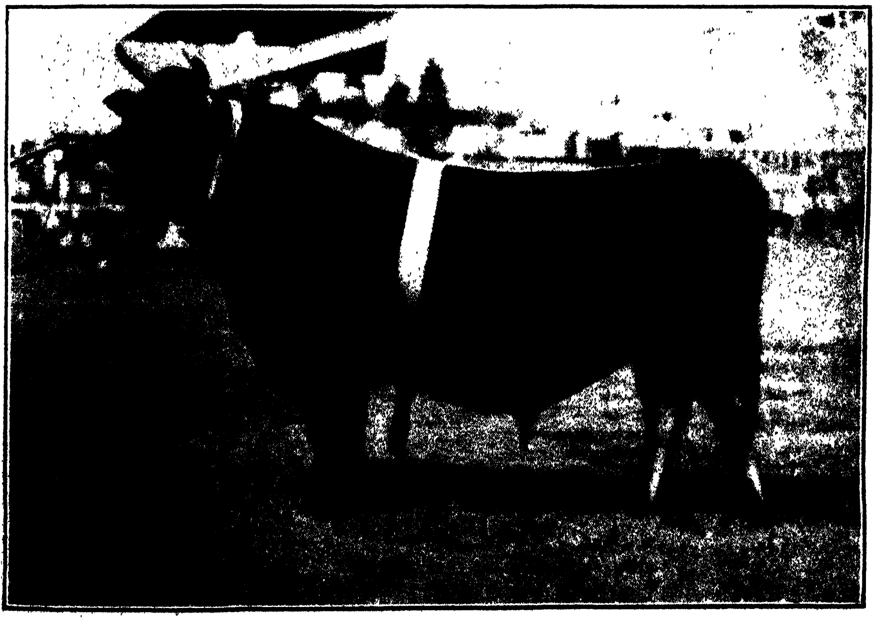

Plate 156.—Trinity Darby, Champion Jersey Bull. Royal National Show, 1929.

PLATE 157.—ST. ATHAN ACTUARY, CHAMPION FRIESIAN BULL. ROYAL NATIONAL SHOW, 1929.

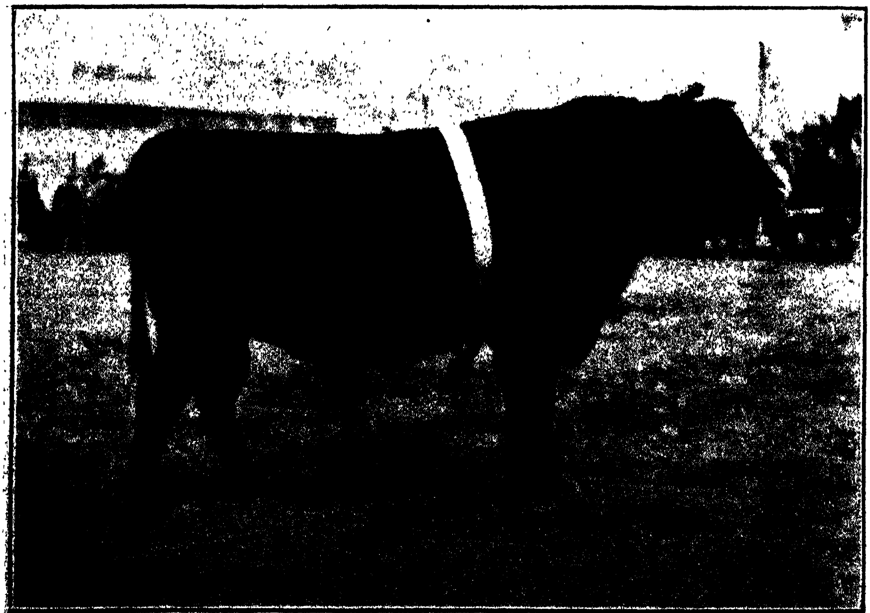

PLATE 158.—LORD KITCHENER, CHAMPION I.M.S. BULL. ROYAL NATIONAL SHOW, 1929.

Plate 159.—Wollongbar Monarch (A. E. Gillespie), Champion Guernsey Bull. Royal National Show, 1929.

Plate 160.—The Entrance to the "Valley of the Giants," Brisbane Show, 1929.

This realistic replica of a section of Satinay Forest on Fraser Island was one of the most interesting pavilion displays at the recent Royal Exhibition.

LUNG WORMS IN CALVES.

By A. H. CORY, M.R.C.V.S., Chief Inspector of Stock.

This affection is known as verminous bronchitis, hoose, or husk. The worms found in the lungs are the *Strongylus micruris* and *Strongylus pulmonaris*. The former are the larger, being about 1 to 3 in. long; whilst the latter is only ⅔ to 1⅓ in. in length. This disease has been known since the year 1744, when Ruysch discovered worms living in the air passages of calves. Nicholls also refers to the same disease in 1756, when it assumed an epizootic form in England.

Symptoms.

If the worms are not very numerous, one notices an occasional husky cough; and, if the animals are driven or excited, the breathing may appear short and hurried. The disease gradually spreads from animal to animal until the majority exhibit this peculiar cough or hoose. After a few weeks, the cough becomes more frequent, and appears to be suffocating the animals—in some cases suffocation actually takes place. A frothy liquid sometimes streaked with blood is discharged from the nostrils. This discharge contains eggs, also embryo and mature worms. The movements of the worms are easily recognised, particularly when placed in a little warm water. The calf loses condition and strength; the mucous membranes of the eyes and mouth become very pale in colour; eyes sunken; skin hidebound, dry, and scurfy; the hair staring; and occasional diarrhœa. The animal wanders away from the others, and is found lying down apparently listless and poverty-stricken. The duration of the disease varies according to the number of worms present and the general condition and constitution of the animal. Some cases only last two or three weeks, whilst others survive for several months.

Upon *post-mortem* examination the worms can be found in the air tubes, the lining of which is inflamed; and the lungs frequently have a somewhat mottled or patchy appearance.

Prevention.

Healthy calves should be kept from paddocks where infested animals have been, but horses and sheep can be turned into them with safety. The land, if damp or boggy, should be drained; waterholes are a great source of infection, and should be avoided, if possible; buckets or troughs are better, as these can be frequently cleansed and disinfected. Keep up the strength of the animal by giving good nutritious food, and allow constant access to salt, because salt destroys the young worms as they are taken into the animal's body. Animals dying from this affection should be thoroughly burned or buried deeply.

Treatment.

The quickest and most reliable treatment is to inject a solution directly into the trachea (windpipe). Various solutions have been used; but the following is recommended, and is the dose for a calf:—

Oil of turpentine	1 drachm.
Carbolic acid	10 minims.
Chloroform	½ drachm.
Glycerine	1 drachm.

To be thoroughly mixed together before using each dose; then slowly injected by means of a syringe into the windpipe.

The needle of the syringe is inserted between the rings of the trachea (windpipe) about half-way down the neck. Some people advocate making a small incision in the skin with a clean knife before inserting the needle; but, if the needle is fairly thick and carefully handled when being pushed through the skin, it will be found unnecessary to incise the skin. This injection causes considerable distress to the animal by setting up paroxysms of coughing; but it passes off without setting up serious irritation, and is effective in destroying the worms.

In bad cases it is advisable to repeat the injection on two or three occasions, allowing some three days' interval between the injections; but in many cases one injection will be found sufficient.

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THE Udder of a Cow may be likened to a Business—it is profitable or otherwise. Most Farmers these days realise the advantages of weeding out the stragglers and stocking up with cows whose Udders represent a profit. But there is more to it—The Best Cow in the World is of little use unless all of its Butterfat is taken from the Milk with a good SEPARATOR. The moral is obvious—stock up with cows with a well developed "Business End", and seek the co-operation of the—

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If it is impossible to procure a syringe, a drench composed as follows can be given, but its action is not so effective:—

Oil of turpentine	½ oz.
Creosote	½ drachm.
Tincture of camphor	½ oz.
Milk or linseed oil	4 to 6 oz.

This drench should be given once or twice weekly for some three or four weeks.

Sheep, and particularly lambs up to twelve months of age, are similarly affected with worms in the lungs, although not the same worms as found in calves. The treatment described in these notes will be found just as effective, except that the dose of medicine given is considerably smaller—viz., about one-quarter to one-half of the above doses.

THE QUEENSLAND CHEESE INDUSTRY.

A SCIENTIFIC INVESTIGATION.

A scientific investigation is to be made in Queensland into the manufacture of cheese with a view to the permanent maintenance of the cutput at the highest grades, and for this purpose a special committee consisting of Professor J. K. Murray, B.Sc. (chairman), and Mr. C. McGrath (Chief Government Dairy Expert) has been appointed.

This action has been taken at the instance of the Minister for Agriculture and Stock (Mr. H. F. Walker), who announced recently that the terms of reference to the committee would include the following requests:—

(1) To investigate the circumstances connected with the reduction in the percentage of gradings of cheese as choice and first grade, commencing from the month of October, 1928, and continuing to April, 1929.

(2) To watch any developments in the 1929-30 summer of a similar character.

(3) To ascertain the causes thereof, and to suggest remedies therefor.

(4) To make any other suggestion which would tend to the improvement of cheese manufacture in Queensland.

Mr. Walker said that he was desirous of affording every possible encouragement to that important section of the dairying industry which was concerned in the manufacture of cheese. Queensland produced more cheese than any other State of the Commonwealth. The figures for the year ended on 30th June, 1928, showed that the Australian production was approximately 30,000,000 lb., of which Queensland produced about one-half. Queensland was responsible for the Commonwealth's export of cheese. A good reputation had been established for Queensland cheese on the world's market, although improvement had been shown to be possible in certain directions. In recent years efforts had been made to stimulate the consumption of cheese in Australia, which at 3½ lb. per capita was considerably less than that in many other countries; for instance, in the United States of America the consumption per capita was approximately 5 lb., and in the United Kingdom it was 9¾ lb.

His attention had been drawn to the fact that last summer the grading of cheese showed a tendency for choicest and first qualities to be reduced in percentage in certain months, and for the quality again to improve after the new year. As some difficulty was being occasioned manufacturers in this connection he had decided to assist by instituting a scientific investigation. A special committee had, therefore, been constituted of Professor J. K. Murray, B.Sc. (chairman), and Mr. C. McGrath, Chief Dairy Expert, with power to add to their number, and co-opt the assistance of any persons considered advisable.

He hoped that the committee of investigation would be successful in locating the cause of the trouble, and that generally its investigations would be of benefit to the industry. He had asked the Cheese Board and the Cheese Manufacturers' Association to co-operate with the committee in making all necessary information available, and he felt sure that this co-operation would be forthcoming.

GRAIN EXPERIMENT PLOTS ON THE DOWNS.

Mr. H. F. Walker, Secretary for Agriculture and Stock, has received the following report (29th August, 1929) from the Director of Agriculture, Mr. H. C. Quodling:—

In company with Mr. C. S. Clydesdale, Agricultural Instructor, an inspection was made in the last week of August of several Departmental wheat, barley, and oat experiment plots in different parts of the Darling Downs.

Flag Smut.

In consequence of the occurrence of Flag Smut in last year's wheat crop in practically every district, a fact confirmed by officers of the Field Staff of the Department deputed at the time to carry out the necessary inspection, experiments were designed this year by the Plant Pathologist to determine the susceptibility or otherwise of the more commonly-grown varieties to the disease, plots for this purpose being established at Roma State Farm and at Allora. Although the wheat in the plots is not very advanced, the disease has already appeared as a result of the artificial infection of the seed, indicating its rather serious nature. Last year the Department supplied practically all wheatgrowers with information concerning the disease, and the methods recommended to keep it in check. At the present early stage of growth of this year's wheat crop, it would be difficult to readily detect the presence of the disease even if it were present. However, it is rather improbable that crops will be quite free from Flag Smut this season, as its presence was noted late in August in the Allora district in a rather promising, well-grown, forward crop.

This Season's Wheat Crop.

Observation was also made over the section of country traversed of the general condition of this season's wheat crop, which, generally speaking, is looking remarkably well, the early-sown areas being particularly promising as a result of two light, but very opportune, falls of rain in the course of the month. The area cropped this season appears to be fully equal to that of last year, and, if satisfactory growing conditions continue, a good harvest seems assured. At the present time, crops which give the best promise are those planted on early and well-prepared land, which had been summer-fallowed.

Plenty of sub-soil moisture, as a result of this practice, was found in the areas systematically prepared and cultivated, affording unmistakable evidence of the value of good cultivation to trap and conserve moisture; the shallow working of the rich, heavy black soils of the Darling Downs proving a very satisfactory method of tillage.

Wheat and Sheep.

Judging by the inquiries made at the Department by graziers on the Downs, some of which were recently followed up by personal visits, there is every indication that several sheepowners intend breaking up and cropping a portion of their holdings, with a view to providing green fodder for ewes and lambs; also for fattening sheep for the market. Obviously, there is almost unlimited scope on the Darling Downs for expansion in this direction, and if the practice were universally followed it would undoubtedly assist in stabilising the sheep-raising industry in this favoured portion of the State.

EFFECT OF METALS ON MILK.

An interesting and important paper on the effect of various metals on milk and milk products by Professor Hunziker was read in the course of the recent World's Dairy Congress week in London.

The investigations involved a study of the resistance to corrosion of nineteen different metals—plated metals and metallic alloys—to the action of sweet and sour milk and cream; of the individual organic acid contained in milk and cream; of numerous washing-powders and chemical sterilisers; and of sodium and calcium brine. The investigation included the effect of these metals on the flavour and physical properties of the milk and milk products. The following conclusions have been arrived at as a result of the investigations:—

1. Zinc, iron, galvanised iron, and copper proved utterly unsuitable metals for dairy factory equipment. They not only corroded profusely, but developed in the milk product objectionable flavours with unfailing regularity. These off-flavours were chiefly of the metallic flavour character. These tests emphasise the fact that much of the metallic cream that arrives at the creameries is due to rusty cream cans, and that the preservation of the tin coating on the inside of the can is an exceedingly important factor in controlling the quality of the cream.

2. Nickel silver, Monel metal, and poorly-tinned iron also injured the flavour of the milk, though the flavour defect was not so pronounced, and the loss in weight due to corrosion, while considerable, was not as great as in the case of the metals under Group 1. These metals are unsafe for use in the construction of milk plant and creamery equipment. Monel metal proved somewhat more resistant to corrosion and less damaging to the milk product than nickel silver.

3. The ordinary chromium steels, such as Ascoloy and Enduro, and also aluminum and aluminum manganese alloy, proved quite resistant to corrosion, and in most cases harmless to the milk product. Ascoloy and Enduro, however, while resistant under most conditions up to a certain point, pitted and rusted freely under severe conditions. Enduro showed somewhat greater resistance than Ascoloy. This suggests that these ordinary chromium steels are not safe alloys to use in dairy factory equipment.

Pure aluminum had no appreciable effect on any of the milk products excepting very sour milk, such as acidophilus milk, in which it developed a slightly metallic flavour. Likewise, its resistance to corrosion, excepting in the presence of alkalies, was generally good. The greatest weakness of aluminum is its high corrosiveness in contact with alkalies, such as are contained in the washing-powders and in alkaline brine. In the case of sodium carbonate and sodium brine, the resistance of aluminum may be very greatly augmented by the addition of a small amount of sodium silicate. Aluminum is being used advantageously in European factories for milk storage tanks and milk shipping cans.

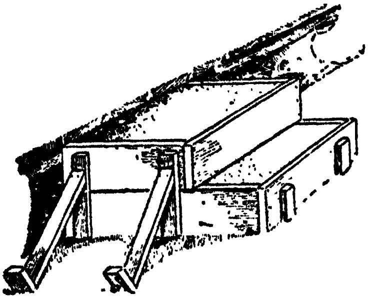
4. Nickel, tin, and properly tinned copper carried no noticeable off-flavour in the milk product, and their loss in weight due to corrosion was comparatively small. These metals, while also slightly soluble in lactic acid, may be considered safe metals for use in milk plant and creamery equipment as far as their effect on the flavour of the milk product is concerned. The tin proved more nearly completely inert than the nickel, which tarnished readily and caused a slight off-flavour in acidophilus milk.

5. Allegheny metal, which is a special chromium-nickel-steel alloy, proved superior to any of the other metals studied. It had no effect on the flavour of any and all milk products, and it suffered no loss in weight, and showed no visible signs of corrosion in organic acids, sweet and sour milk and cream, alkaline washing-powders, and brines. This alloy promises to play an important role in the construction of our future dairy equipment.

6. The presence of two or more metals in the same piece of dairy equipment is fundamentally undesirable. Most metals used may differ in their electrical potentials, and this in turn invites corrosion and impairment of flavour by electrolysis. For similar reasons impurities in metals, as for instance, impure aluminum, such as cast aluminum, also copper alloys and imperfectly tinned iron and copper, are equally unsatisfactory.

CONCRETE STEP FORM.

Concrete is far superior to any other material for making steps to the house and outbuildings. Wood steps soon decay and settle out of shape. In making concrete steps only a very simple form is required. The sketch shows clearly just how to make a good form with a small amount of material. One inch material is used in making the form, which is braced and staked as shown to prevent bulging when the concrete is poured in.



This type of form can be used for any number of steps, as it is really a series of separate forms one upon the other, each form being shorter than the one below to give the desired tread.

IMPORTATION OF STUD STOCK.

Extract from Commonwealth "Hansard," August, 1929:—

Mr. Josiah Francis (Queensland) asked the Minister for Markets and Transport, upon notice—

(1) Is there now any prohibition of the importation of stud stock into Australia from Great Britain and Ireland owing to foot and mouth disease?

(2) What are the details of the assistance offered by the Government to the primary producers of Australia to facilitate the importation of approved stock for stud purposes?

Mr. Paterson: The answers to the honourable member's questions are—

(1) The importation of stud stock into Australia is, for the present, permitted subject to certain quarantine conditions.

(2) The following are the main points of the Government's proposals regarding the importation of pedigree stock from Great Britain and Ireland:—

(*a*) The shipping companies, with one exception, have agreed to carry such stock freight free.

(*b*) All other incidental expenses connected with the transport of the stock from the port of export in Great Britain to the port of importation in Australia to be borne as follows:—

(i.) One-third by the purchaser;

(ii.) One-third by the Commonwealth and State Governments concerned in equal proportions;

(iii.) One-third by the Empire Marketing Board.

(*c*) Any breeder who receives financial assistance under the scheme must not dispose of the stock within two years of the date of its importation. Should he sell during that period he must refund the amount of any assistance granted to him.

(*d*) The scheme will operate for a period of two years.

GROUP OF EXHIBITORS, OFFICIALS, AND ENTHUSIASTS AT THE PIG SECTION AT THE BRISBANE EXHIBITION, 1929.

See Plate 161.

Front Row (left to right)—W. F. Kajewski (Glencoe); B. V. Neale (Cambooya); C. W. Krause (Marburg); H. H. Sellars (Tabooba); G. F. Davidson (North Arm); H. Franke (Cawdor); D. Wells (Kureelpa); Mr. ——— with Shepperson, of Kin Kin; W. Elton, junr. (Cambooya); C. W. B. Young (Lagoon Pocket).

Second Row (left to right)—W. W. Elton (Cambooya); R. G. Watson (Kingston); C. G. Dale (Lagoon Pocket); T. Price (Goodna); E. J. Shelton, H.D.A. (Department of Agriculture and Stock, Brisbane); J. P. Bottomley (Chief Steward, Pig Section); H. J. Keevers (Burra Burra, N.S.W.); C. C. Low (North Arm); Mrs. Dalton (Birkale); Mrs. and Mr. A. Alford (Traveston); H. Severns (Gatton College); S. Whittaker (Casino, N.S.W.).

Third Row (left to right)—L. A. Downey, H.D.A. (Department of Agriculture and Stock, Brisbane); F. W. Martin (Stock Agents Ltd., Brisbane); J. J. Slack (Ipswich); T. M. Wallace (Dinmore); W. Kennedy (Kingston); A. Wells (Kureelpa); G. H. Naumann (Pinkenba); W. Walker (Lamingtou); J. T. Griffiths (Kingaroy); R. Turpin (Manly); A. F. Conochie (Tingoora); Geo. White (Steward, Pig Section).

Two Back Rows (left to right)—E. L. Melville (Prior's Pocket); M. Porter (Wondai); P. V. Campbell (Lamington); Mr. Scarabelloti (Nashua, N.S.W.); Assistant to A. F. Conochie; Mr. Buckley, junr. (Beaudesert); D. R. Laws (Chermside); Arthur Brown (Toogoolawah). *At back*)—A. V. Shepperson (Kin Kin); H. A. Proposch (Maclagan); W. Koehler (Yamsion); T. J. Handley (Murphy's Creek); L. Skerman (Kaimkillenbun).

Plate 161.—Group of Exhibitors, Officials, and Enthusiasts at the Pig Section at the Brisbane Exhibition, 1929.
(For list of names, see page 440.)

SOME EXTERNAL PARASITES OF THE PIG.

E. J. SHELTON, H.D.A., Senior Instructor in Pig Raising.

In an interesting article on "Some External Parasites of Swine" in the "Pig Breeders' Annual, 1929-1930," and from the pen of Mr. K. D. Downham, Adviser in Veterinary Science at the University of Liverpool, emphasis is laid on the fact that lice cause considerable loss to pig breeders. It has been estimated that 2 to 6 per cent. of the market value of a pig is lost, due to the presence of these parasites. Each time a louse feeds it punctures the skin of the pig and withdraws its blood and lymph. The irritation is severe, particularly if the animal is heavily infested, and in addition to the loss of blood, the fact that the animal's rest is constantly disturbed is prejudicial to growth and fattening. Mr. Downham states that swine which are attacked by lice in large numbers become unthrifty, suffer from lowered vitality, and thus become more susceptible to diseases and attacks by other parasites.

All this is borne out in Australian experience where lice are just as plentiful and as active as they are in countries overesas. In fact, it is quite possible lice cause more trouble here, for pigs are kept in the open much more than overseas and they usually receive considerably less attention, though this latter fact is to be regretted, as neglect and carelessness are responsible also for very severe losses.

Describing some of the parasites, Mr. Downham states that the hog louse (*Hæmatopinus adventicus*) is a blood-sucking parasite one-sixth to one-fourth of an inch in size (this parasite is also known as *H. suis*); the female is larger than the male and can be distinguished from it by the absence of a dark line on the underside of the abdomen, along the middle of the last three segments, which is a feature of the male. Lice possess six legs, and their feet are adapted for clasping the hairs or bristles of the pig. The female lays about 100 eggs during her life, these being deposited on the hair close to the skin and firmly adhere to the hair or bristles by a glue-like substance. The eggs hatch in about a fortnight and the young lice soon find the tender parts of the skin for feeding, a favourite site being the under surface of the ear, particularly in cold weather. Maturity is reached when the young lice are ten days old, and the young females commence to lay eggs at twelve days old. The whole life cycle is passed on the pig. Infestation occurs from contact of infected animals with clean animals. The parasites do not live more than a day or two off their hosts. The hygiene of the pig and its habitation should receive attention. The ears should be cleaned out with a mixture of pine tar, two parts, and cotton-seed oil, one part, or crude petroleum. Swabs soaked with the liquid should be used for the ears, the under surface of the body, and between the thighs. The side and back of the animal should be sprayed with crude petroleum by means of a watering can or a can with a flattened spout. Large herds heavily infected should be dipped; any of the preparations recommended for sheep scab may be used for this purpose. Dipping should be done in warm weather. It is a good plan to have an ear inspection once a month during the winter to keep down these parasites.

Mange Mites.

Mites belonging to two genera cause mange in swine, *Sarcoptes scabiei suis* and *Demodex folliculorum suis*. These parasites spend their entire life on the host and live on the blood and tissues of the animal they attack.

The body of the Sarcoptic mite is rounded above and flat below. Its size is about one-fiftieth to one-sixtieth of an inch. The thoracic and abdominal regions are more or less united, the epidermis is transversely striated, and bristles are present on the back. The mandibles are shaped like a crab's claw. They possess four pairs of short thick legs. In the male the hind legs are equal in length, suckers being present on the first two pairs of legs. The males are smaller than the females. If the mites are placed on a dark background they are just visible to the naked eye, but a lens or the low power of a microscope is necessary for identification.

The female mange mites burrow into the skin and lay eggs in the burrows. In from three to ten days the eggs hatch and the young mites, after moulting several times, begin to lay eggs in ten or twelve days. By this time they are near the surface, due to the normal shedding of the epidermis and to the rubbing of the infested animal. The young mites then maks fresh burrows in the under surface of the skin and repeat the process. The irritation is severe, and the sensitive areas become inflamed and swollen. The swollen areas are larger than pinheads and have dried serum adhering to them. As the number of mange mites increase the raised areas become closer together, the hairs fall out, scabs are formed which rub off, and the serum oozes out and often a raw surface is left. Later the skin is corrugated, and in chronic cases wrinkles are left. If badly affected the animals become emaciated, and if left untreated will die.

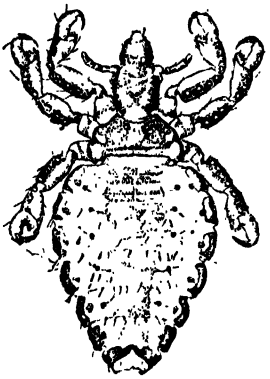


Fig. 1. The Pig Louse (Female).

(From "A Text Book of Entomology." W. S. Patton and F. W. Cragg, 1913.)

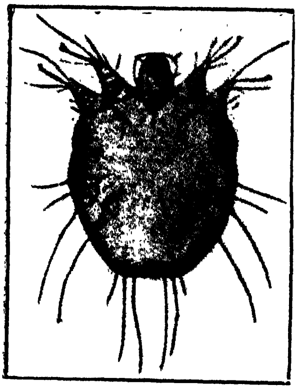


Fig. 2. *Sarcoptes major var. Suis. S. Sarcoptes squamiferus.* Female. Abdomen. Magnif. 75.

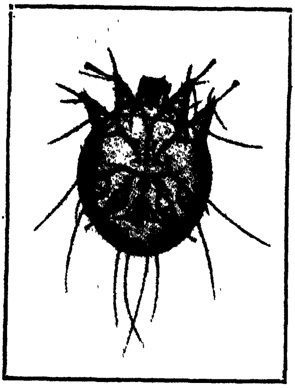


Fig. 3. *Sarcoptes major var. Suis.* Male. Abdomen. Magnif. 75.

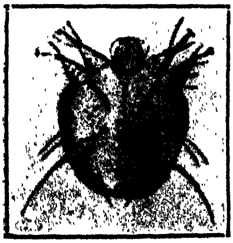


Fig. 4. *Sarcoptes major var. Suis.* Nympha. Magnif. 75

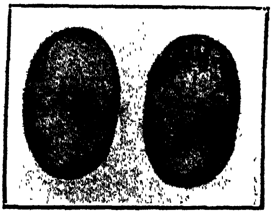


Fig. 5. *Sarcoptes major var. Suis.* Eggs, the contour of the embryo showing. Magnif. 75.

(Figs. 2, 3, 4, and 5 from Hytyra & Marek's "Special Pathology and Therapeutics of the Diseases of Domestic Animals.")

Plate 162.—External Parasites in Swine.

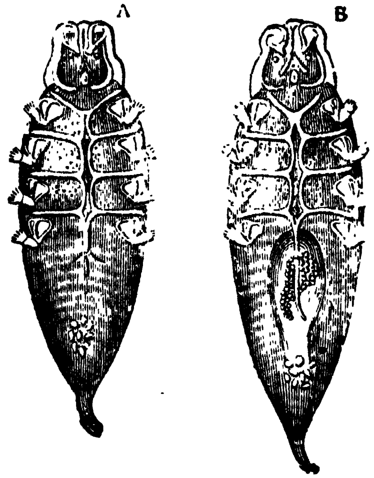


Fig. 6. Demodex of the Pig, seen on the ventral surface; magnified 250 diameters.—Csokor.

A, male; B, female, with an ovum visible in the abdomen.

(Reproduced from Neumann's "Parasites," by permission of the publishers.)

Fig. 7.- *Sarcoptic scab* in the pig.

PLATE 163.—EXTERNAL PARASITES IN SWINE.

Diagnosis consists in finding the mites by means of scraping the affected parts of the skin with a blunt-edged knife and examining the scrapings under a magnifying glass or by treating the scrapings with a hot 10 per cent. solution of caustic potash and examining under a microscope.

Sarcoptic mange is contagious and is generally spread directly by contact of one infested animal with another. Man may become infected and extreme irritation results for about thirty days, but the mites will not live much longer than that on another host. Crowding and unclean conditions predispose to the rapid spread of the disease. Weak, unthrifty animals are more prone to mange than healthy ones, and pigs fed upon a vitamin-deficient ration are very apt to suffer from this and many other diseases. The mites do not multiply after leaving an animal, but remain alive for two or three weeks or longer, and their eggs can survive for nearly as long under suitable conditions.

Pigs suffering from Sarcoptic mange should be treated with (1) crude petroleum, (2) cotton-seed oil and kerosene in equal parts, or (3) kerosene and lard, 1 half-pint of the oil to 1 lb. of the lard. These preparations may be applied with a brush or cloth and rubbed well in. Freshly treated pigs should not be allowed to become chilled, should not be moved rapidly, or subjected to strong sunshine. All litter should be destroyed by burning and the sty thoroughly disinfected before using for healthy pigs.

Demodectic or Follicular Mange.

This is caused by a very small mite, *Demodex folliculorum suis*. It is wormlike in shape; the cephalo-thorax is followed by a transversely striated abdomen which gradually tapers towards the end. It is about one-hundredth of an inch in length; the male is smaller than the female. These parasites are found in the hair follicles and sebaceous glands of the skin, where the whole of the life cycle is completed. The parts of the pig's body most favoured by the parasites are the under parts of the head, neck, and abdomen and inside the thighs. The lesions often commence round the snout and the eyes and spread to the surrounding parts. The parasites are generally found in clusters and cause pustules, which often run together and form cavities and scales. If badly affected, pigs will become unthrifty, and septic sores and scabs on the animal appear and give an opportunity for bacteria to gain an entrance to the skin. The condition is not a very common one in swine, and is more serious in the dog; other animals affected may be cattle, goats, and man. The best method of treatment for pigs affected by these parasites is the regular application of crude petroleum to the affected parts.

WHAT EVERYBODY WANTS.

A TALK TO PIG FARMERS.

In an interesting and informative set of booklets published by the National Pig Breeders' Association of England, dealing with several of the most prominent of the British breeds of pigs, an introductory paragraph calls attention to the requirements of each individual section of the pig industry under the caption of "What Everybody Wants."

We reproduce the story here with the permission of the association, of which Mr. E. J. Shelton, the Senior Instructor in Pig Raising in Queensland, is an honorary member.

What the Breeder Wants.

The pig breeder wants hardy, long-lived animals with such good constitutions that he rarely has to open his medicine chest or call in the veterinarian. They must be active, contented foragers, willing to cut down the food bills by picking up a good proportion of their keep from the pasture. (This is important too, especially here in Queensland where pig raising is an adjunct to other branches of farming.)

Both boar and sows must be prolific and ready breeders, the litters must be large, and each pigling a strong and quick grower (slow growers and unprofitable sorts are all too common and are distinctly unprofitable and should not be tolerated.) Both stores and breeding animals must have the right conformation of good butchers' pigs in order to command the highest possible prices. They must be of firmly established

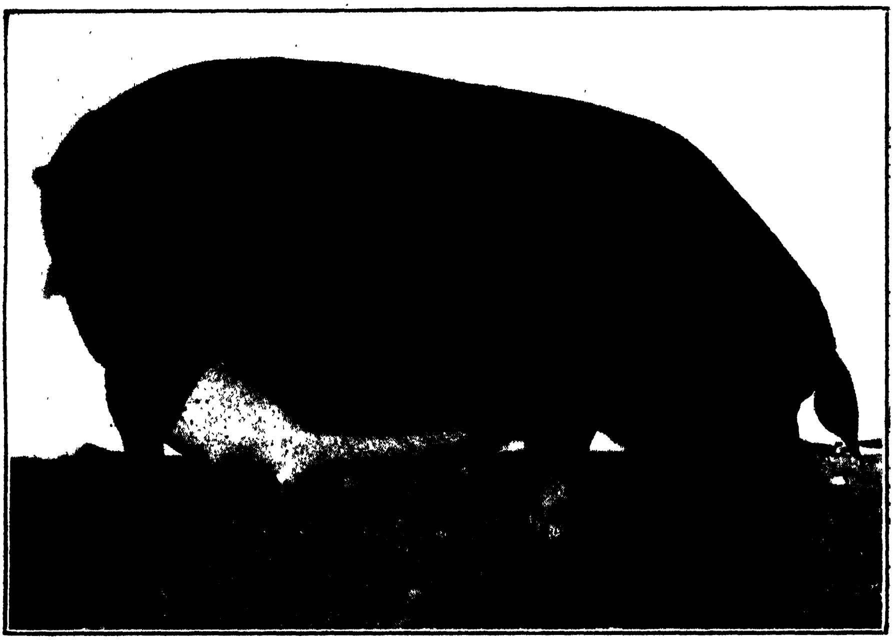


PLATE 164.—" YAMSION FLOWER," CHAMPION DUROC-JERSEY SOW, ROYAL NATIONAL SHOW, 1929.

PLATE 165.—" HOMEVILLE TELLER," CHAMPION POLAND-CHINA BOAR, ROYAL NATIONAL SHOW, 1929.

type, so that a litter shows uniformity in all points (all very desirable features here as well as in England). We have a long way to go in Queensland before we can claim to have a maximum of the very best types, but there has been a vast improvement in recent years, and the improvement still goes on. The distribution of stud pigs from stud sales like those held annually at Brisbane Exhibition is a special feature and one well worth all the encouragement breeders can focus on them.

What the Feeder Wants.

Continuing the story, the N.P.B.A. states that the feeder wants only pigs in hard (or as we call it, growthy) condition and with keen appetites (a pig with a poor appetite is a poor pig indeed).

They must have been weaned in strong-growing condition and be able to go straight on to pasture or into yards until it is convenient for him to put them in sties for a quick finish. (The Departmental pamphlets, ''Weaning the Pig'' and ''Flushing the Breeding Sow'' deal with these features, and should be in the hands of every farmer.) These feeder pigs must stand sty feeding well and eat without fads or fancies or aches and pains. Above all, they must be able to put on weight quickly and in the proper parts (a study of the results obtained by members of the Queensland Boy and Girl Pig Clubs indicates that many junior farmers are obtaining results even better than those obtained by many of the senior farmers along these lines). The feeder is always on the lookout for pigs light in the front, with fine shoulders, a straight level back and a good back end (or loin and hams, as we refer to them in Queensland, where also the demand is constant and improving for the correct type of pork and bacon pig, and where top prices may always be obtained, provided the pigs are of correct weight and in good marketable condition).

What the Pork Butcher Wants.

The N.P.B.A. booklets state the maximum live weight for a porker is 120 lb., the minimum, say, 80 lb., a good average being 90-100 lb. (As porkers these average live weights are O.K. for Queensland conditions, where it is usual to consider around 30 per cent. a fair deduction from live weight at trucking station in country districts —often far removed from the slaughtering establishments—to dressed and ''cooled off'' weight at the factory.) The London pork market, which takes approximately a million carcasses a year, prefers the smaller weights (as also is the case in Queensland) and pays the best prices for them. The pigs must be long, well-proportioned, broad and full along the back, with the tail well up. The cheap parts of the carcass, particularly at the fore end, have to be light, and the more expensive joints well developed with fair length of loin. The fat must be white and firm and in moderate proportions to the lean, so that the necessity of trimming is avoided. (Queensland pork buyers like these pigs too, as also do bacon curers, and would willingly pay top prices for more of them if they were available continuously all the year round.)

The small porker must be quick growing in order to be plump, neat, light, and full of meat, but not too fat. Porkers with fine hair, thin skins, and absence of wrinkles sell better than coarse, rougher-looking pigs in all markets. (This is so in Queensland also, where we are certainly becoming more particular every year.

What the Bacon Curer Wants.

The N.P.B.A. indicate that the British bacon curer wants pigs between 160 and 210 lb. that kill well and with a small percentage of offal. (For Queensland markets these weights are far too heavy. The pamphlets, ''Pig Raising in Queensland—Some Economic Phases'' and ''Trade Classification of Pigs'' deal with Queensland conditions, and to these pamphlets our readers are specially referred.) The bacon curer dislikes paunchy baconers, because they kill wastefully. The pigs must be long in the back, so that the sides cut up with deep, heavy ''middles.'' (Sides of bacon are not a trade line in Queensland, but the remarks apply with full force to the cuts popular here, viz., flitches, middles, and hams.) The carcass must show a high proportion of lean to fat with full, thick, firm underline. The meat must be in the right place—that is, mostly behind the spare rib, the forequarter being proportionately light. A heavy jowl and broad coarse shoulders are wasteful and lose money(the heavy-shouldered pigs are equally undesirable here). The ham must be long and wide, with meat right down to the hocks. A fine skin, free from coarse wrinkles and with long straight hair is considered to indicate in the live pig plenty of lean flesh and fine but hard bone. (There is a good demand in Queensland for pigs carrying all the good points referred to herein.)

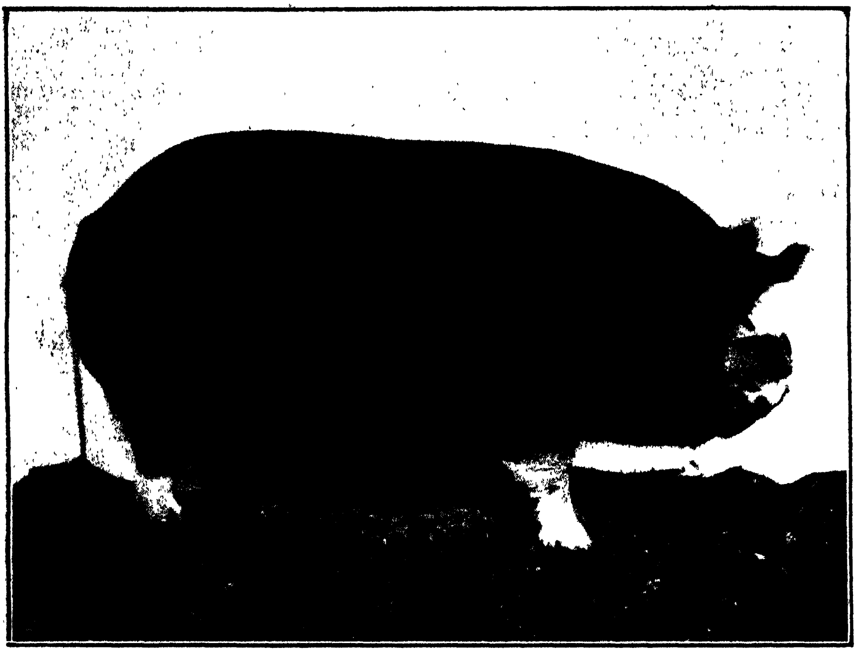


PLATE 166.—"GLENBURRA DUKE," CHAMPION BERKSHIRE BOAR, ROYAL NATIONAL SHOW, 1929.

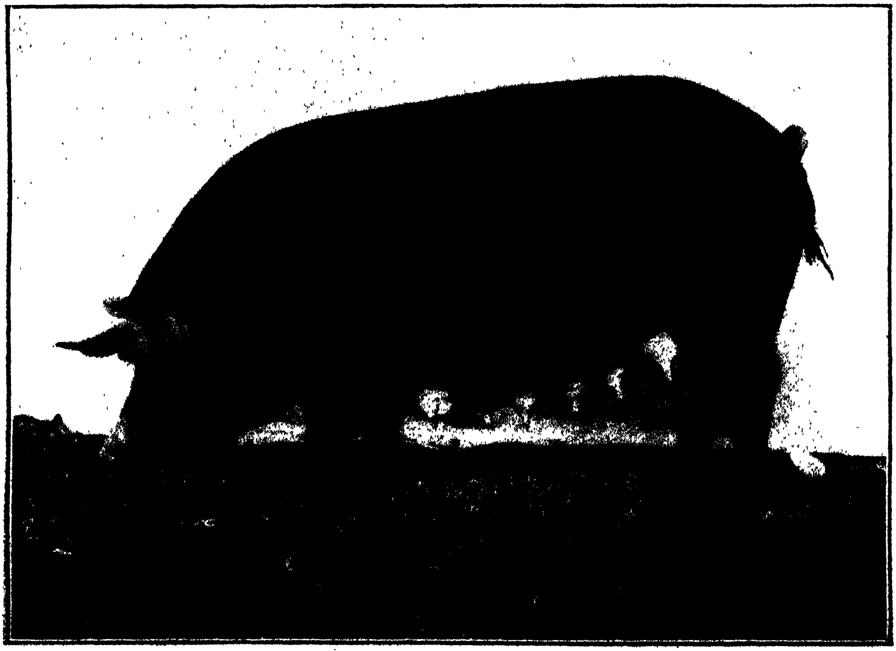


PLATE 167.—MONDURE QUEEN, RESERVE CHAMPION TAMWORTH SOW (A. ALFORD, TRAVESTON), ROYAL NATIONAL SHOW, 1929.

What the Housewife Wants.

As in Great Britain, so in Australia, the housewife dislikes too much fat in pork, bacon, and ham, because it is wasteful and she cannot find a use for it all. What fat there is must be firm, and never soft or oily. The lean must be well interlaid with fat, and must be moderately hard, yet never tough, while full of flavour.

When she pays for "best streaky" she expects to get it, and therefore her grocer demands good "middles" to be able to supply her.

Queensland housewives like good bacon too and more would be eaten and sales of fresh pork would increase if we could supply the housewife with exactly what she requires at a reasonable price and attractively prepared and placed before her. Just as in England the National Pig Breeders' Association is working along lines suggesting an all-round improvement in matters associated with the pig industry, so in Australia the Australian Stud Pig Breeders' Society, and in Queensland and the other States, the State branches of this organisation are doing likewise. Good work is also being done by the Australian Pig Industry Council, linked up with the State committees and the various Bacon Curers' Associations. With them the Departments of Agriculture and Stock are also working in the hope of paving the way for a more prosperous and lucrative pig industry.

Readers desirous of obtaining copies of the booklets referred to above are advised to communicate with Mr. Alec Hobson, Secretary, National Pig Breeders' Association, 92 Gower street, London, W.C. 1, England.

WHEAT PROSPECTS IN THE ROMA DISTRICT.

The Secretary for Agriculture and Stock (Mr. H. F. Walker) has received the following report from the Director of Agriculture, Mr. H. C. Quodling:—

An inspection was made in the second week of September of the crops growing at the Roma State Farm, and it was satisfactory to note that excellent progress had been made by the new crossbred wheats, specially bred and selected by the manager, Mr. R. E. Soutter, to meet requirements in Queensland. Although several inches of rain fell in April, less than 70 points had been registered in the last four and a-half months. Notwithstanding this extraordinarily dry period the growth and development of the wheat, oats, and barley in the breeding and propagation plots was good, the better-grown crops invariably being found on the fallowed land, pointing unmistakably to the fact that soil moisture conservation by systematic cultural methods is the principal factor in crop production.

The Value of Systematic Cultivation.

Elsewhere in the district and in other parts of the wheat-growing belt, a remarkable contrast in the growth and development of crops was observed, due in the generality of cases to a loss of soil moisture by evaporation, principally through late ploughing or failure to maintain a soil mulch on the cultivated lands, such loss being sufficient to account for the change from a payable to a non-payable crop. Obviously, in a season like the present one, those who systematically directed efforts to the early working of their land and to the trapping and storing of moisture will reap the benefit thereof.

On Roma Downs.

On the invitation of Mr. R. H. McGeoch, a visit was made in company with the manager of the State Farm to Roma Downs Station where Mr. McGeoch has over 200 acres on a deep, sandy loam soil under cultivation with wheat and lucerne, the latter crop being subsequently planted for fattening-off sheep. Several varieties of wheat bred at the State Farm were included in the number being grown under field conditions. The wheats generally were even and well grown, and the manner in which they had developed on such a limited rainfall proved a valuable object-lesson of what can be done by carefully planned farming operations. The crops grown on land broken up about twelve months ago on which the surface had since been kept in a cleanly, well-worked condition, were from 3 feet to 3 feet 6 inches in height and well out in head. In many instances less than half an inch of rain had fallen since planting time, and none of the crops had had more than three-quarters of an inch during the last four and a-half months.

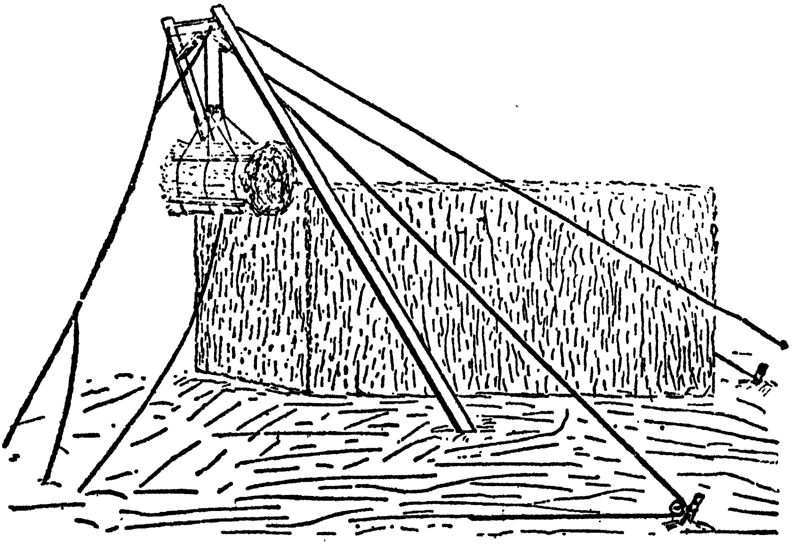
Last year between 300 and 400 tons of wheat were cut for hay and stored in vermin-proof sheds, as a dry time reserve. The quality of the hay was found to be exceptionally good. Although the type of soil being farmed is lighter and of a more sandy nature than that usually chosen for lucerne, this crop is doing well. Only a limited quantity of seed, about 3 lb. per acre, is usually sown, thin planting being observed to permit of more root-feeding space for individual plant development with a view to making the best use of the limited rainfall. Mr. McGeoch is having another 400 or 500 acres cleared to extend his wheat and lucerne cultivation scheme.

Flag Smut Experiments.

The Flag Smut experiments at the Roma State Farm are showing excellent promise. One well-known fungicide has so far afforded almost complete protection to the plants grown from spore-infected seed. It is expected that valuable data will be forthcoming when the Plant Pathologist concludes this and the other series of Flag Smut experiments at Allora.

EASILY BUILT AND OPERATED STACKER.

An inquirer asks us to publish a diagram of a "stacker" which one could use with a hay-fork to transfer hay from the load to the stack conveniently and economically.



The accompanying drawing shows a stacker similar to the one referred to. This stacker is called a two-pole, swinging stacker, and is very convenient in the construction of medium sized stacks. It is a good outfit for the man with not more than 30 or 40 tons of hay to stack. Trunks of trees of sufficient length to allow the bundles to clear the desired height of stack may be used for the poles. These poles should not be less than about 5 inches in diameter at the small end, and the cross-beam and its braces should be about "half-lapped" into the poles and bolted. The poles are raised and guyed so that they have the desired amount of swing, the guy ropes of one side being tight, while those of the other are loose. When a bundle is being taken off the load the poles are leaning toward the load; one end of the draw rope is fastened to the cross-tree at the top, while the other is run through the pulley on the fork or slings, after which it is run through a pulley, at the top of the derrick; then, to the team after passing through an anchored block at the ground. The anchor must be so situated that when the bundle has reached the cross-beam the poles will be pulled back so as to carry the bundle over or past the centre of the stack. The construction and operation of this stacker are simple, and are made clear by the drawing.—The "New Zealand Farmer."

THE FARM TRACTOR.

STARTING TROUBLES.

As you know, the tractor starts on motor spirit and is later switched over to kerosene when the engine becomes hot and vaporiser sufficiently heated to vaporise the heavier fuel As the ignition is the most likely cause of trouble, test this first in the following way:—Remove one of the plugs from the cylinder head, attach it to its connecting wire and lay it on the cylinder block so that the skirt of the plug is touching the block, but so that the points and the connection end are not in contact; then turn the engine over by hand and see that the spark is getting to the points. If no spark appears, examine the plug carefully for carbon formation on the electrode, which may be causing a short circuit of the current, prohibiting the spark from jumping the points. Being assured that the plug is all right, examine the connection wire for short circuits, and, having eliminated this, give your attention to the magneto. The most common cause of trouble in this little machine is the contact breaker. If, through wear on the cam, the points are not breaking no spark can be formed. If the points are roughened, burned, or dirty, the result will be the same. If this is so, use a small nail file or magneto file to trim the platinum points. See also that there is no oil on the points. When examining wiring connections from magneto to plugs, look for loose connections, broken wire inside the insulation, or worn insulation, which would result in a short circuit to some portion of the engine against which the wire is lying. If a spark is occurring at the plug points it may be too weak or too small to fire the charge. A bluish-white, fat spark is the most efficient, a dull-red spark being generally ineffective. The correct gap for plug points is 1/32 inch.

Causes of Weak Compression.

If the ignition is all right, replace the plug and try the motor for compression. If this is weak, it will be due to one of three factors:—

(1) Leaking piston rings;

(2) Badly seated or pitted valves;

(3) Sticking valves.

With (1) and (2) the trouble can only be corrected by dismantling the engine, but with (3) the valves can be freed by removing the valve cover and squirting the sticking stems with a little kerosene until the valve is free and then thoroughly lubricating the stem with cylinder oil.

If the compression is good, the next likely cause of trouble is the fuel system. See that the petrol line from fuel tank to carburettor is free and that petrol is gaining entrance to the float-chamber. Examine the jet to see that this is quite clear and look for water in the float-chamber. Any of these causes would result in the fuel not getting into the combustion chambers of the cylinders.

It is very often the case, particularly with the tractor that is working hard, that the ignition, through general wear and dirt, becomes weak, and, although the tractor gives excellent service while working, it is very difficult to start in cold weather.

If the cause of the weak spark cannot be removed, then it may be necessary to drain the radiator and fill with hot water in order to vaporise the fuel more fully to get the initial explosion.

A Common Cause of Hard Starting.

The common cause of hard starting with the old Fordson tractor is water in the commutator. This is generally formed as follows:—When the tractor is left to cool off after the day's work the commutator cools off rapidly and the hot air coming from the motor condenses on the inside of the commutator and forms small globules of water. This causes a "short" between the commutator and the roller, with the result that starting is very difficult. With a Fordson that is hard to start, the first thing to do is to remove the commutator, wipe it out thoroughly with a piece of rag, and introduce about a spoonful of light clean lubricating oil.

The factors mentioned above are the main causes of hard starting, and should you be unsuccessful after eliminating all these suggested causes, then it is a job for an expert.

Engine Missing.

Probably the most common irregularity encountered with the tractor engine is what is commonly termed "missing," meaning the failure of one or more of the cylinders to fire regularly. The result is, of course, loss of power out of all proportion to the percentage of cylinders which are not working.

There are many ways in which missing can be detected, such as irregular sound of exhaust explosions occurring in the silencer, a decided knocking in the motor and excess of motor vibration, and general loss of power and unsatisfactory pulling.

The fuel system may be the cause of missing. If the line to the carburettor is partially choked, sufficient fuel will not be obtaining entrance to the float-chamber in order to supply explosions to each cylinder. Water in the carburettor will have the same effect. If the mixture is too rich or too lean, missing will occur. An over-rich mixture is generally indicated by black smoke issuing from the exhaust. A lean mixture very often results in small explosions occurring in the carburettor and vaporiser.

Poor compression, due to leaky or pitted valves or badly worn pistons and rings, will also cause miss-firing. The sticking of valves, either intake or exhaust, will also cause the engine to miss, or if the valves are not properly adjusted the result will be the same.

In all cases where miss-firing is taking place operations should be stopped immediately, regardless of cost, and the trouble righted. A missing cylinder causes great havoc in a motor, not only from the point of view of the incorrect balance of the engine causing excessive vibration and wear, but owing to crankcase dilution. It must be remembered that the non-exploding cylinder is still drawing into the combustion chamber quantities of gas; the gas is not being exploded and a considerable quantity of it finds it way past the piston rings into the crankcase oil, resulting in excess crankcase dilution.

There is no doubt that the premier tractor fuel to-day, which can be depended on, not only to give greatest power and economy, but also to give those essentials of good idling and easy starting under bad weather conditions with a minimum of crankcase dilution, is the famous new "Cross" kerosene. This new fuel is a departure from any kerosene previously manufactured by the Shell Company and is specially prepared to meet every requirement and every class of work indulged in by the tractor owner to-day.

Backfiring.

Sometimes an engine, particularly when it is being started, backfires into the carburettor. A moment's thought on the matter will make you appreciate that for this to occur at least one of the inlet valves must have been open when the actual explosion occurred. Investigation will generally prove that a valve has stuck. On the other hand, the seat of the valve may be so very bad as not to cause any obstruction to the explosion entering the induction system.

An excess of carbon on the piston will also cause a backfire to the carburettor, particularly if the motor has been running for some time, as the carbon deposits become so heated as to burn, thus causing the explosion very often before the intake valve has closed.

Ignition may cause backfiring by a retarded spark or a spark too far advanced, or if the magneto wires are connected to the wrong plugs.

The most common cause of backfiring is a slow-burning fuel mixture, which in turn is most often caused by insufficient heat on the motor.

It should be borne in mind that in order to obtain economy from a tractor fuel it must have weight, and in order to explode the weighty fuel sufficient heat must be on the vaporiser to completely turn it into combustible gas.

If the correct working heat of 200 deg. and 210 deg. is not being obtained, and a blind is not fitted to the radiator, then you should suggest to the tractor owner that he tie a bag across the front of the radiator. Heat on the motor is all-important, and too much stress cannot be laid upon it.

Overheating.

While efficient operation can only be obtained from a tractor when it is working at a temperature near boiling point, very often through various causes the motor *over* heats. As you know, the boiling point of water is 212 deg., and if it were possible to work the tractor motor at 210 deg. without overheating, this would be the most satisfactory temperature for it. Nevertheless, overheating sometimes occurs and is damaging to the motor.

The cause may lie either in the ignition or the carburettor or in the motor itself. A late or retarded spark or a very weak spark over a long period will cause overheating. Again, if the carburettor mixture is too rich or too lean overheating will result.

But more often the cause of overheating is to be found in the engine itself, and it is caused by the excess of carbon on the cylinder and piston head. This overheats the motor because the carbon is a poor conductor of heat and does not permit the heat caused by the explosions to dissipate itself through the cylinder head into the circulating water. A poor quality lubricating oil or an oil too heavy or too light in body will cause overheating; impeded circulation of the radiator tubes; the water pump not working properly, resulting in poor circulation; a slipping fan belt, resulting in insufficient air being drawn past the radiator tubes; bent fan blades; all these causes can be easily corrected.

If overheating is allowed to continue, bad wear results, and many a good engine has been ruined from this cause.

Smoke.

When black smoke issues from the exhaust it is almost a sure indication that the mixture is too rich, and the smoke you see is actually unburnt fuel. Other causes for the issue of black smoke are poor quality kerosene and insufficient motor temperature, both resulting in poor combustion.

Blue smoke issuing from exhaust is an indication that either too much oil is in the crankcase or that the oil is of poor quality or too light in body. While the crankcase should be kept well up to the full mark with lubricating oil, it is not good policy to put in any excess quantity, as it only results in excess carbon deposits and does not give any better lubrication.

White smoke.—In some tractors small quantities of water are injected with the fuel mixture. The issue of white smoke from the exhaust is an indication that too much water is being taken in. This is a matter of easy adjustment.

Crankcase Dilution.

It is a common fallacy that crankcase dilution means that unexploded portions or kerosene in liquid form run down past the piston rings into the crankcase oil. It should be borne in mind that crankcase dilution takes place in any motor burning a heavy fuel like kerosene for the following reason:—When the piston goes down to the bottom of its stroke and draws in a cylinderful of gas the gas comes into contact with the cylinder wall, which, in comparison with the vaporiser, is cool. The result is that the gas partially condenses on the cylinder wall and is absorbed by the oil thereon, and from there works down into the crankcase. The presence of the kerosene in the crankcase oil rapidly destroys its lubricating qualities.

The main cause of crankcase dilution is insufficient heat on the motor. The corrective for this has been previously explained.

Other causes of crankcase dilution are, missing cylinders, poor compression, badly worn pistons and rings, sticky valves, &c. More harm is done by crankcase dilution than any other factor of tractor operation.

Power Loss.

One of the most serious troubles which can be encountered is loss of engine power. There are many factors which can be responsible for this. We itemise them hereunder:—

Ignition.—If the spark is retarded and firing too late full power is not developed. It is seldom, however, providing that the spark lever is fully advanced, that a spark will become retarded, unless the engine has been previously overhauled and incorrectly timed.

A weak spark, due to bad ignition, is another factor, resulting in only portion of the charge being exploded, due to the lack of heat of the spark.

Fuel System.—A too lean or too rich mixture prohibits the motor from developing full power. There must be enough fuel present in the mixture to utilise all the oxygen in the air which has been mixed with the fuel. With a lean mixture this does not occur. On the other hand, if too much fuel is present for the amount of oxygen, too little pressure is generated in order to develop maximum power. The ideal mixture is one wherein every atom of fuel can be burned.

Motor.—Probably the most common cause of power loss is due to carbon. These deposits reduce power in three ways—

(1) By filling part of the combustion chamber, thereby preventing a full charge being drawn in.

(2) They cause pre-ignition by becoming so hot as to ignite the incoming mixture too easily.

(3) They prevent the escape of the heat developed by the explosions, thereby causing overheating, which expands the mixture to such an extent that the explosion is weak.

If the motor is too cold, loss of power results, because the mixture has not been completely vaporised and therefore does not completely fire.

Poor lubricating oil will cause loss of power, because it does not keep the wearing surfaces apart, and permits unnecessary friction. Furthermore, a poor lubricating oil does not seal the spaces between the piston rings and the cylinder walls, thereby allowing the explosive gases to escape on the power stroke, instead of exerting the pressure which means power.

Another common cause of loss of power which is not generally given credit for the trouble, is an impeded exhaust system. If carbon is blocking the exhaust ports or the exhaust pipe considerable back pressure is set up in the combustion chamber, thereby impeding the entrance of the incoming charge of gas.

Other factors, such as bad compression, due to leaky valves and worn piston rings, are, of course, responsible for poor power.

It is interesting to note that the new "Cross" kerosene of the Shell Company is remarkable for its property of complete combustion, wherein an absolute minimum of crankcase dilution is assured. Only in a kerosene specially prepared to meet all conditions of tractor operation is this very desirable feature to be found.

Answers to Correspondents.

PIG RAISING.

(Selected from the outward mail of the Senior Instructor in Pig Raising, Mr. E. J. Shelton, H.D.A.)

Cassava as Pig Food.

F.M. (Mundubbera)—

The tubers of cassava should be boiled before use and the water discarded, this as a precautionary measure, seeing that most farmers are not conversant with the different varieties, non-poisonous or otherwise.

It is as a standby for use in time of drought that cassava appeals most as a pig food, for the plant is very hardy and will live and do reasonably well during periods when other crops will dry off. It would probably pay very much better during reasonably good seasons to depend more upon sweet potatoes than upon cassava. These tubers can be fed without any risk at all, either in the raw or cooked form. We prefer to recommend the growth of sweet potatoes by reason of the fact that farmers are more conversant with methods of cultivation and use, but it must be remembered that the feeding of an excess of sweet potato vines may be productive of harm, while it does not pay at any time to depend entirely upon the one class of food. There are many excellent varieties of sweet potatoes, and for details see our pamphlet on the subject.

A TRIBUTE.

Naturally we are gratified at the results of the 1929 Royal National Show. Record-breaking shows are only gained by reason of the record-breaking co-operation of so many loyal friends.

Because of your great co-operation great successes have come our way, and we desire to pay you this tribute and ask you to accept our warmest thanks.

ERNEST BAYNES, President.
JOHN HIRON, Chairman of Council.
H. W. WATSON, Acting Secretary.

Brisbane, August, 1929.

MAIZE—THE GROWING CROP.

Important as is the thorough preparation of the soil for maize, it is no more important than thorough after-cultivation. The cultivation of maize should begin almost from the day the crop is planted, and the first operation should be a light harrowing. This harrowing may be left with advantage until four or five days after planting, as it then becomes almost imperative if rain falls soon after sowing; especially on heavy land. In such circumstances, this harrowing will make all the difference between a poor and a good germination; the harrowing kills a heavy crop of weeds, and aerates and warms the soil.

The use of the harrow should be continued until the maize is about 6 inches high. The single-horse cultivator is an implement that is used far too early in the cultivation of the crop by many farmers. Many cannot yet reconcile themselves to the use of the harrow on the growing crop, but the practice is growing rapidly, for it is a case of "once tried, always used." There are, however, two words of caution to be remembered when harrowing growing corn: the first is to select a bright day for the work, as the plants are soft and brittle on a cloudy, cool day, or in the early morning, but quite tough and supple in the heat of the day; the second is to keep the harrow free from clogging rubbish, as this is the cause of many plants being torn out.

The use of the harrow on young maize saves a very large amount of more expensive cultivation and hand-hoeing later on, as it destroys a big crop of young weeds and grass which later becomes troublesome. A light lever harrow is the best type of implement for this purpose.

The next cultivation should be done with a riding instrument which straddles the rows—either a springtooth or rigid-tooth cultivator, or a disc cultivator. The last-named is an implement which has rapidly gained favour in the maize districts on account of the good, clean work done by it. It can be made to throw as much hill to the rows as is desired by altering the set or cut of the discs, and it is a considerable improvement on the objectionable practice of hilling with the plough. The rigid-tooth cultivator is a better implement than the springtooth for tearing out summer grass, couch, or paspalum which threatens to obtain a hold, and which is not so easily dealt with by the disc cultivator.

When the maize becomes too high to "straddle" with a two-horse cultivator, recourse must be had to a single-horse implement, the use of which should be continued for as long as practicable up to the tasselling stage.

The depth of the cultivation should be regulated according to the height of the crop, it being borne in mind that as the crop grows in height its roots more nearly approach the surface. During the early stages of growth, cultivation may be given to a depth of 4 or 5 inches, but later this must be reduced to 2 or 3 inches, or a large number of valuable feeding roots will be destroyed.

For this reason the practice of hilling with the plough is not recommended, as, when the maize is 18 inches or 2 feet high, a large number of roots are cut through by ploughing close to the rows. If hilling is thought necessary at this stage it should be done with a disc cultivator, or with mouldboard sweeps on the single-horse cultivator. It is thought, however, that hilling is a practice for which, in many cases, no good reason can be given. Where young maize "goes over" with the wind, it usually "picks up" again readily of its own accord, and hilling is not necessary for this reason alone. The only justification for hilling with the plough is in a wet season, when a heavy weed growth or grass has obtained a good hold in the rows, and requires early smothering to kill or check it. But this condition can be avoided in most seasons by a thorough preparation of the soil before planting, and by harrowing after planting both before and after the maize is up.

Many farmers practice the removal of suckers from the maize crop with the idea of increasing the yield, and incidentally of providing a little fodder for stock. The experience of the Department has been that the value of suckers is practically offset by the cost of their removal, and that the yield of the crop is much reduced by desuckering.—A. and P. Notes, N.S.W., Department Agriculture.

General Notes.

Staff Changes and Appointments.

Mr. F. B. Coleman, Inspector, Pure Seeds Act, Brisbane, has been appointed an Expert for a period of seven weeks as from the 19th August, 1929, during the absence of Mr. F. F. Coleman, Expert and Inspector, Pure Seeds Act.

Police Constable T. A. Brady, of Gympie, Acting Sergeant R. S. Christie, of Coen, and Acting Sergeant J. R. Gannon, of Augathella, have been appointed Inspectors of Slaughter-houses as from the 31st August, 1929.

Mr. Noel Manning, of Kolijo, has been appointed Canegrowers' Representative on the Farleigh Local Sugar Cane Prices Board, vice Mr. Philip Pearce, resigned.

Mr. S. C. Smith, Inspector of Slaughter-houses, Mareeba, has been appointed also Inspector of Stock and Brands as from the 31st August, 1929.

Mr. E. R. Boyd, of Hawthorne, has been appointed a Dairy Inspector, on probation, Department of Agriculture and Stock, Brisbane.

Constable T. Dunlea, of Ravenshoe, has been appointed an Acting Inspector of Stock.

All Dairy Inspectors have been appointed also Inspectors under and for the purposes of "*The Diseases in Stock Act of* 1915."

Mr. S. E. Pegg has been appointed Dairy Inspector, on probation, Department of Agriculture and Stock.

The Officer in Charge of Police at Cambooya has been appointed also an Inspector of Stock.

Mr. G. J. Gray, the General Superintendent of the Mount Isa Mines, Limited, has been appointed an Honorary Ranger under the Animals and Birds Acts, as from the 14th September, 1929.

Mr. T. R. Quinn has resigned his position as Senior Clerk (Accounts) Agricultural Bank, Brisbane, as from the 26th August, 1929.

A Progressive Queensland Firm for Farmers' Needs.

Customers of the firm of Buzacotts (Queensland) Limited, who regularly call at the company's offices to renew acquaintance with the chiefs of staff will be interested to know that a move has been made back to their own premises in Adelaide street, Petrie Bight, next door to Atcherley House and Australian General Electric Company. We are advised that the business is quite settled down in its new premises, and the managing director is confident that the change will mean much better service to customers and anticipates another successful year. The company has on its large staff specially trained experts in pumping and irrigation, dairy requirements, jetting and spraying plants, and orchard pest controls, as well as for Buzacott steel gates and fencing and other rural requisites.

The Medicinal Value of the Milk Thistle and other Herbs.

Mr. J. A. Hamilton, Carbeen, Cairns, writes:—"I beg to offer you our appreciation of your paragraph in the August "Journal" on the great medicinal value of the milk thistle. It is indeed of inestimable value. I have tested them for many years. We often got sores on our hands pulling corn and they were very difficult to heal, but I found the milk of the thistle would cure them. At the same time, when I got thirsty pulling corn I used to chew the milk thistle leaves and they alleviate thirst and seem to act as a tonic. I am quite sure if the thistle and lettuce, endive, and chicory, which all seem to be more or less of the same family, were more generally used, many ailments would be relieved, including cancer. Mrs. C. L. H. Wallace, editress of the "Herald of Health" (London), was the authority for the statement that a lady who had cancer had been cured by living on lettuce, with hot baths and hygienic treatment advocated in her paper. This was forty years ago. I'd like to bring to your notice a herb book published by Messrs. Heath and Heather, St. Albans, Herts., England. . . . . The weed Cobbler's Peg will cure old running sores and fistula on horses. Ageratum will also cure sores. These are aboriginal remedies. The bark of the Leichhardt tree is a cure for malarial fever. I learnt this from Mr. J. Curr, of the Gulf."

Travelling Stock Regulation.

Regulation 37 of the Diseases in Stock Act has now been amended in order to give Stock Inspectors power to define the route by which stock shall be travelled.

Banana Permits.

The Minister for Agriculture and Stock (Mr. H. F. Walker), when interviewed recently relative to the issue of permits to those desiring to grow bananas or increase their areas under this fruit, stated that the present system of dealing with applications for permission to plant banana suckers and the issuing of the necessary permits is being handled in the most efficient manner possible.

The system in force is that as soon as the inspector for the district receives the application for permission to plant he forwards it to the Department of Agriculture and Stock with his endorsement as to the circumstances of the case, and in all cases where the prescribed conditions are complied with a permit is issued and promptly despatched to the grower; or if permission is considered inadvisable the grower is immediately informed of the fact. Mr. Walker added that the conditions appertaining to planting further areas were identical with those recommended by the growers' representatives on the recent deputation.

From the foregoing it will be seen that the banana growers who are in a position to conform with the required conditions are not subjected to any unnecessary delay in the matter of obtaining sanction to plant bananas.

The Royal Society of Queensland.

The ordinary monthly meeting was held in the Geology Lecture Theatre of the University on 26th August. Mr. F. Bennett, B.Sc., was in the chair. Mr. H. J. G. Hines, B.Sc., was proposed for ordinary membership.

Mr. C. T. White, F.L.S., read a paper by himself and Mr. Francis entitled "Contribution to the Queensland Flora, No. 4." Two new species—*Labichea Brassii* from North Queensland and *Albizzia xanthoxylon* from the Alberton district—were described as new, and several plants were recorded from Queensland for the first time.

Dr. D. A. Herbert read a paper, entitled "Changes in Osmotic Pressure in Relation to Movement of *Mimosa Pudica.*"

Dr. Herbert exhibited (1) *Empusa muscæ*, a fungus causing fly chlorea, and (2) *Penicillium expansum*, a mould from a decaying custard apple, also found on the apple.

Mr. C. Schindler exhibited a rust fungus, *Phragmidium longissimum*, on *Rubus parvifolius*, from Mount Crosby.

Restrictions on Banana Planting.

A deputation representative of the banana growers of Diamond Valley, Mooloolah, waited on the Minister for Agriculture and Stock (Mr. H. F. Walker) recently to discuss certain phases of banana planting. The deputation comprised Messrs. J. E. Delaney and C. A. Joseph, and was introduced by Mr. R. J. Warren, M.L.A.

Mr. Delaney said that the growers in the district were being refused permits to plant because of the limited occurrence of disease in their neighbourhood. The position was that two plants affected with Bunchy Top had been found in the locality, and because of this permits were being refused in accordance with the regulation which had recently been issued stipulating that no permits would be granted within a radius of two miles of an affected plantation. He thought that the regulations should be more flexible.

Mr. Joseph supported Mr. Delaney's remarks. He had had considerable experience with Bunchy Top, having grown bananas in the Tweed district for some years, and he would rather be within half a mile of an affected plantation with a high hill between than within ten miles where there was a direct airline.

The Minister, in reply, said that he would constitute an Appeal Board consisting of two representatives of the Department and two growers, who would hear any cases presented to it on their merits. He would also arrange for this to be done in any other district similarly affected. Mr. Walker also announced that he would enforce any recommendations made by the Banana Industry Committee.

Scrub Turkeys and Cactoblastus.

As an extract from the progress report of the scientific work of the Commonwealth Prickly-pear Board in Australia during June, 1929, indicated that the Scrub Turkey was feeding on the Cactoblastus larvæ, an Order in Council has been issued reducing the period of protection for Brush or Scrub Turkeys on prickly-pear infested land from an annual period of seven months to a period extending from the 1st to the 7th July in each year, inclusive.

Marketing of Tomatoes.

Following upon the issue of a notice by the Committee of Direction of Fruit Marketing that they intended to issue a "Direction" for the marketing of tomatoes intended for treatment at factories, a petition was received asking that a poll be held to decide whether or not the "Direction" should operate. Regulations have now been issued under the Fruit Marketing Organisation Acts to govern the handling of the necessary ballot.

The "Direction" will apply to tomatoes intended for manufacturing purposes produced in the district bordered on the north by Nambour, on the west by Rosewood, on the south by the New South Wales border, and including the islands in Moreton Bay. It will apply for three months from the 15th September, 1929.

The State Wheat Board—Mr. J. T. Tod Appointed Chairman.

The Minister for Agriculture, Mr. H. F. Walker, has announced that certain changes have been made in the personnel of the State Wheat Board as from the 31st August. It has been decided by the Government to regard the wish of the Board that an elected representative of the growers shall be appointed as chairman. He has therefore appointed Mr. J. T. Tod, of Goomburra, to that position.

Mr. Tod is an extensive landholder on the Darling Downs, having considerable interests in wheat growing and dairying in the Goomburra and Inglewood districts. He is well and favourably known throughout Queensland as president of the Co-operative Dairy Companies' Association, which position he has held for many years. As well as being a member of the Wheat Board, Mr. Tod is also a director of the Warwick Co-operative Dairying Association and was also a member of the first Council of Agriculture.

The Minister has also appointed the Director of Marketing, Mr. L. R. Macgregor, to the Board.

Mr. Walker also informed the Press that he has been looking into matters pertaining to the wheat industry, and that he felt that there is scope for considerable development in that industry, given the full co-operation of all concerned. He had, therefore, convened a conference which was held in Brisbane on the 4th September, between the Wheat Board, as representing the growers, and representatives of the millers, over which he presided.

Preference for Queensland Goods Urged.

"I am determined to see that Queensland people get a full recognition of what our secondary industries are doing as far as propaganda can assist, and I want to have them built up," said Hon. H. E. Sizer (Minister for Labour and Industry), when officially opening the John Reid Hall at the recent Brisbane Show.

The hall contained numerous industrial exhibits neatly displayed.

In introducing the Minister and asking him to perform the opening ceremony, Mr. M. P. Campbell (president of the Chamber of Manufactures) said that some people thought that the secondary industries were antagonistic to the primary ones. That was a wrong impression. Their one aim was to do the best for the State.

In opening the hall, Mr. Sizer said that by virtue of the office he held for the time being he was constantly in contact with secondary industries. He was determined to see that the people of Queensland obtained full recognition of what the secondary industries were doing as far as propaganda could assist, and he intended to have them built up as far as he was able. It was essential for the Empire's progress that the secondary industries should be fostered.

There was great scope for education to develop manufacturing industries in Queensland, and if the people would stand behind the manufacturers and the State, and purchase home-made goods, then the industries would grow, and unemployment would disappear quicker than otherwise or by a wholesale loan policy.

New Bird Sanctuaries Proclaimed.

An Order in Council has been issued declaring Connolly Dam, Silverwood (Warwick), Rifle Creek Dam (Mount Isa), and portion of Harrow Station (Cambooya) to be sanctuaries for animals and birds from which places it will be unlawful for any person to take or kill any animal or bird.

Pure Water for Dairy Cows.

"What is the cheapest and best form of food for dairy cows?" "Pure water," the owner of a cow which last year produced 10,584 lb. milk and 542.6 lb. of butter-fat, is stated to have replied, adding: "Only be sure that the water is put in the cow and not in the milk can."

Milk is approximately 87 per cent. water, and if the cow does not have access to an unlimited supply of fresh, clean, palatable water her milk flow is bound to suffer heavily. A high-producing cow will consume from 25 to 30 gallons of water per day. A reliable automatic water supply system has proved to be one of the most valuable items of a dairy farm's equipment.

Food and Emotions.

"There are three ways of regarding the body. The first is as an enemy, an evil to be fought and ill-treated; the second as the spoiled child, pampered and put first, and protected; and third, as a good servant and friend, that is the winning, harmonious co-operator with mind and spirit. The third way is the correct way in which to regard the body. The whole personality should be considered. Looking to the harmonious working of the body did not mean fussiness. Wholesome food eaten in a happy, controlled spirit may do more good than a faultless diet combined with worry. All negative emotions such as anxiety, fear, resentment, and anger have ill-effects on the body. Confidence, trust, and love, and other positive emotions liberate the physical powers."—DR. EVELYN SAYWELL, in an address to a health conference.

SEED MAIZE.

UNPRECEDENTED DEMAND FOR DEPARTMENTAL STOCKS.

The demand for seed maize this season was unprecedented, and although large stocks of several varieties were held these were quickly exhausted.

The response to the advertisement of seed for sale in this Journal was extraordinary. The rush of early orders soon covered the whole of the supply available, and a very large number received later and which could not possibly be filled had to be returned with regret.

Each season sufficient seed to sow some thousands of acres is raised by the Department, and the demand is ever increasing. This is proof of the reputation won for the improved strains and grades of grain bred by the Department; and it also shows that farmers are realising the value of planting seed of tested varieties.

All the varieties that were advertised in this Journal have been grown by the Department for many years, and the valuable work of improving type and yielding capacity is carried on from season to season.

The Department is continually introducing new varieties, which are tried out in the several maize-growing districts, and any that prove good yielders and of a suitable type are retained. Included among them is Funk's Ninety Day, which is so popular with Queensland maize growers.

Plans are now well forward for meeting every possible future demand for selected seed of all improved varieties tested under ordinary field conditions, and thus avoiding the risk of disappointment to growers who desire to obtain the best seed from the Departmental plots.

The Way of the Reformer.

"It is quite proper to accept a compromise as an instalment. If we cannot get the whole, it may be quite right to accept the half. We may live to secure the other half another time. We must, however, see what the acceptance of the half involves. It may be that if we accept it we shall be hindering instead of advancing a genuine reform. We may be sidetracked. John Morley put this with great force when he said, commenting on the French saying that small reforms are the worst enemies of great reforms:—'There is a sense in which the saying is profoundly true. A small and temporary improvement may really be the worst enemy of a great and permanent improvement, unless the first is made on the lines and in the direction of the second. . . . The second possible evil of a small reform may be equally mischievous—where the small reform is represented as settling the question. . . . It sets men's minds in a posture of contentment which is not justified by the amount of what has been done. and which makes it all the harder to arouse to new effort when the inevitable time arrives.' "—JAMES SCOTT, in "Chambers' Journal."

Shearing of Lambs.

Generally speaking, lambs intended for sale direct from their mothers should not be shorn. The value of the wool will not recompense the reduction in the quality of the flesh due to the handling and bruising, nor does a shorn lamb look attractive, rarely realising a good price in the market. The principal item in fat lambs, of course, is the flesh, but the pelt has a certain value, which is practically nil if the lamb has been shorn.

In a season like the present, however, observes the Sheep and Wool Expert of the Department of Agriculture, the question of shearing is one to be considered, as unless seasonal conditions change for the better it seems problematical whether the lambs can be brought to a marketable condition by weaning time, and so long as there is no danger of loss due to cold they may respond more quickly if shorn than if left right through the season in the wool.

With regard to Merino lambs, in ordinary seasons, weaning and shearing are often carried out at the same time, but when, as at present, the lambs are not in very good condition and no good feed is available for weaning them on, the two operations (weaning and shearing) at once may be too great a strain on the lamb's constitution, and it may therefore be advisable either to leave the weaning until a later date or put off the date of shearing.

Uses of Lemon.

Many people prefer lemon juice to vinegar when mixing a salad dressing, and it is much more digestible.

For washing dainty handkerchiefs add a few lemon rinds to the water when it is cold, and boil it with the handkerchiefs, and you will be surprised at their snowy whiteness.

As everyone knows, lemon juice is very useful after an accident with the inkpot. Rub lemon juice on the mark at once, leave for five or ten minutes, then wash off with milk, and the stain will have disappeared.

The juice of a small lemon, or half of a large one, taken first thing in the morning, without adding either sugar or water, is wonderfully helpful for rheumatism and indigestion.

The same treatment will soon make the muddiest complexion clear. After the lemon has been squeezed out, save the skin and rub it over the fingers if you want to remove ink or other stains from the hands. A few drops of lemon juice added to a little glycerine will make the hands soft and white again after a day's work in the garden.

In cookery the lemon is invaluable. Many sauces are insipid unless a squeeze of lemon juice is added. Sauces and custards are all the nicer if the thinly-grated rind of the lemon is boiled in the milk or cream preparation and then strained out. In stuffings a little finely-grated lemon rind adds piquancy and flavour. Many people prefer a slice of lemon in their tea to sugar and milk. Cakes for tea and some light puddings are nice with the finely-grated lemon rind added. Lemons, too, are invaluable for garnishing, their yellow tint adding colour to insipid food. Cutlets, fillets of fried fish, and pancakes all look and taste better if garnished with slices of lemon.

The Care of Hides and Skins.

Careless methods of flaying the skins of cattle and sheep, and excessive branding of cattle and calves, are the causes of heavy losses annually—the present methods of branding are computed to be responsible for damage to Australian hides amounting to a yearly loss of half a million sterling. Inefficient curing and the dirty and stained condition in which hides and skins are often marketed are other causes of depreciation, while the cuts and score-marks received by the living animal through horning, contact with barbed wire, and other external injuries, also combine to discount values.

The practices responsible for bad hides, and the correct methods of slaughtering and skinning, curing, and marketing, are discussed in detail in a pamphlet recently issued by the Department of Agriculture. It is pointed out that farmers, station-owners, and country butchers supply a fair proportion of the hides and skins reaching the city skin stores. Country hides are for the most part ripped off carelessly, without regard to final shapeliness, and very often very little attempt is made to cure them or preserve them in any way. As they are generally marketed indirectly, they frequently reach the tanner in a condition known as "slippy," and are more or less putrid, and very little good leather can be manufactured from them.

If consignors improved their methods of branding, flaying, and curing their hides, the reader is reminded, city buyers would quickly recognise the fact and pay accordingly. By disposal on the farm to country dealers the hides eventually lose their identity, and the careful man is not compensated to the full extent for the care he may have exercised. Hides and skins may be forwarded in large or small parcels to the various stores and sold on account of consignors. Clean, well-cured, good-shaped hides, free from scores, cuts, blemishes, and slip, will fetch top values.

The Principles of Sheep Feeding.

The principles affecting the feeding of sheep are studied even less than those affecting the feeding of other animals, observes the Chief Veterinary Surgeon of the New South Wales Department of Agriculture, but their consideration is periodically a matter of very great importance. The writer draws attention to some facts of which pastoralists might well be reminded just now.

The tendency is to regard the fact that sheep have lived for some considerable time on scrub or very dry innutritious food as evidence that the food is sufficient for them, but as a matter of fact a continuous lowering in tone is taking place, varying in degree according to the quantity and quality of the food. This lowering in tone may be so slight that no ill-effects are observed, and when good feed comes again the sheep recover their tone; on the other hand, it may be so marked that the digestive system becomes unable to deal with the food, impaction results, and heavy mortality may follow. This is particularly liable to occur in pregnant ewes towards lambing time, and in sheep that are travelled or put to some other strain. In between these manifestations are all gradations of the trouble, and in many cases only small numbers of the weaker sheep die.

What the animals suffer from is actually slow starvation. The impaction is certainly increased by the astringent nature of so many scrub fodders. It is impossible to lay down any hard-and-fast rules as to when and under what particular conditions mortality will occur, but it is obvious that the longer the period of innutritious feeding the more likely it is to have unfavourable results. Experience with the particular fodders used and the conditions existent on each holding must serve as the owner's guide.

It is plain that prevention of such mortality depends on the supply of food which will counterbalance both the lack of nutritive quality and the astringent nature of the scrubs and rough, dry fodders. Although, to prevent all ill-effects, this must be undertaken throughout the period of dry feeding, it is remarkable how rapidly sheep will recover from very severe loss of tone and impaction—even after deaths have occurred in the flock from these causes—if food is changed. Losses of lambs through deficiency of milk in the ewes (an indirect effect of the trouble discussed) may also be guarded against at the same time by use of the same measures.

But not only does loss occur from continued dry feeding—yet further loss is involved in the sudden change to extremely succulent food. Surprise is often expressed that mortality in sheep is so heavy after the appearance of what is referred to as good food, but, as a matter of fact, such rapid-growing, succulent food as appears after copious rains following drought possesses very little body, and in the already weakened condition of the animal will not sustain life, particularly as at such times the animal requires the production of a good deal of body heat. The question then arises of the possibility of supplying some dry roughage in addition to the green food.

Poisoning of Sheep by Chemical Fertilisers.

An inquirer asks whether sheep are likely to suffer ill-effects from the residue of artificial fertilisers used in the topdressing of pastures.

The ingestion of basic slag has been alleged to have caused the deaths of sheep grazing on land which had been recently dressed with this fertiliser.

Heavy applications, followed by a period of dry weather, when the slag is inclined to lie on the ground or cling in an undissolved state to the roots and stalks, may lead to animals consuming it in quantities sufficient to cause fatal results.

Reputed cases of poisoning have occurred twelve days after sheep had been depastured on to paddocks dressed with slag in the proportion of 2½ cwt. per acre, and in the complete absence of rain. Certain of the animals became ill, were unable to stand, and had to be destroyed.

In experimental cases, the lesions due to basic slag poisoning are those of inflammation of the lining membrane of the stomach and small intestines. The urine may have an opaque creamy appearance.

Experiments carried out in Vienna in 1919 proved that fertilisers such as basic slag, superphosphate, kainit, sulphate of ammonia, nitrate of potash, and nitrate of soda are capable of killing sheep receiving small quantities mixed in the feed.

Under ordinary circumstances, it is rare that sheep are able to pick up from the pasture sufficient of the material to cause death, or even derangement of health.

The possibility of this contingency should, however, be remembered when chemical fertilisers are being used. It is prudent not to depasture sheep on to freshly treated paddocks until the fertiliser has been to some extent dissolved and washed into the ground by rain.—The "New Zealand Farmer."

Bloat in Cattle—Causes and Treatment.

Bloat, or hoven, is due to succulent foods eaten under certain conditions which cause the formation of large quantities of gas in the rumen or paunch, and, in consequence, a swelling of the left flank. It is most often seen in the following circumstances:—

(1) When cattle are turned hungry on to such succulent green food as lucerne or clover.

(2) When cattle used to dry feed are suddenly changed on to green, soft food.

(3) When travelling cattle are allowed access to large amounts of green food, such as variegated thistle.

(4) When cattle gorge themselves on wet grasses or herbage.

(5) When cattle are fed on roots or potatoes under certain conditions.

Some animals appear to be more subject to hoven than others.

Keeping the mouth open with a gag, or a piece of wood, until the beast has belched most of the gas out through the mouth will be useful in mild cases. The internal administration of 1 oz. of bicarbonate of soda and 1 oz. of ginger is sometimes useful, and it may be repeated in a few hours—if necessary.

In a bad case the most effective treatment is the puncture of the paunch. This is done on the left side in the flank—at a point equidistant from the last rib, the edge of the loin bones, and the angle of the haunch. The correct instrument for this purpose is trocar and cannula. The cannula is a tube through which passes a sharp pointed instrument—the trocar. This instrument is thrust into the rumen, and the trocar is withdrawn, leaving the cannula in place, and through this the gas escapes. In case of emergency a knife may be used in the same way, the gas escaping through the cut, but complications may set in and cause death if this is not done expertly. After the gas has escaped the animal might be given a dose of linseed oil (1½ pints) and turpentine (1 tablespoonful). This mixture should be well shaken up while being given.

Every effort should be made to prevent the occurrence of hoven in stock. In feeding lucerne and clover, if the animals are not used to it they should be put on it gradually until they become accustomed to it. If lucerne is fed in a wet state, or after heavy rain—when it is soft and juicy—it will almost always produce trouble; and cattle should, therefore, be kept off it until it is drier.

Whitewash on the Farm—The Spring Cleaning.

Whitewash has a wide application to farm use and deserves a much greater popularity than it at present enjoys. Its ingredients are inexpensive and readily obtained; it is not difficult to make, and it is easy to apply. In addition to these advantages, it protects the surfaces to which it is applied, brightens up dark interiors, and is sanitary. Whitewash may be coloured provided that light tints and shades are used, and that the pigments are not affected by lime. Among such are yellow ochre, raw and burnt umber, and raw and burnt sienna. The surface to be whitewashed should be just as clean as one that is to be painted, and it is a first essential to good results that all dirt, dust, grease, and scaly material be removed before there is any attempt to apply the wash. This implies a liberal use of scrapers and stiff brushes. When the cleaning is finished and the surface dusted, it is well to dampen it slightly just before applying the wash.

Action of Frost on Soil.

It is known that frost is one of the principal agents in the disintegration of rock and in its transformation and final conversion into soil. This action continues to be exercised on the soil, increasing the proportion of fine particles, but with extreme slowness. On the other hand, frost has an immediate effect on soil colloids—e.g., it breaks up compact clayey soils into separate lumps. According to Ehrenberg this effect is not due solely to the expansion to the interstitial water, but also to the growth of ice crystals. The resulting lumpy texture increases the permeability and aeration of the soil, which tends to dry it and facilitate its cultivation without risk of its again uniting into a solid mass. The solidification is apt to be renewed, however, as a result of heavy spring rains, also in many vegetable soils. Attempts have often been made to attribute the beneficial effect of frost to the fact that it renders soluble the nutritive elements in the soil, but this could not be conclusively proved experimentally. On the other hand, it has been shown that the total surface of the particles of a granite soil has increased 6.13 per cent. after exposure to frost. This effect is directly beneficial to plant growth, which shows that the old saying, "If the ground does not freeze the crop will be thin," has not lost its meaning in countries with a cold winter.

Bee Culture.

Whether it is intended to go in for bee-keeping commercially or merely as a hobby, spring or early summer is the most suitable time to make a start. In either case, too, but especially in the case of the person who hopes eventually to depend upon bee-keeping for a livelihood, the enterprise must be given proper thought.

Success or failure is often determined by the method of making a beginning, and it is well to avoid if possible the purchase of bees in old boxes, and the consequent necessity for transferring, which process is itself sufficient to damp the ardour of one who is unacquainted with the work. There is also the risk of introducing disease. The better way is to purchase a hive (or hives) outright. The purchase should be made from a reputable breeder; otherwise the hive should be examined by an expert previous to purchase to certify its freedom from disease. Another method of establishing an apiary is to prepare hives (factory-made for preference) by nailing, painting, and fitting with comb-foundation, and then to purchase prime swarms from a neighbouring bee-keeper when swarming is prevalent.

The land for an apiary should be fairly level, well drained, and for preference the hives should face the north-east. A trellis of passion vines around the plot makes an ideal windbreak, and affords protection to the hives both in summer and winter. The equipment required for the running of a small apiary is neither extensive or costly. The requisites are mostly standardised throughout Australia, which is an advantage. The Langstroth ten-frame hive may be purchased in lots of five with supers at a reduction in price. A smoker, hive tool, veil, uncapping knife, and honey extractor are among the other requisites.

Bees play a very important part in the pollination of fruit trees, and the establishment of an apiary might well be considered by every orchardist. One to three colonies per acre of orchard should show a material increase in quantity and quality of fruit, while sufficient honey and beeswax will at ordinary times be produced to enable a surplus to be marketed. The site of the apiary need not be in the orchard. A small allotment of ground should be selected where the bees are not likely to be disturbed when cultivating.

The Waler still Wanted—Australian Horses for India.

General W. H. Anderson, Director-General of Remounts for the Indian Army, is at present visiting Australia in connection with the supply of horses for the Indian Army.

The impression, he says, that horses from Australia are no longer required, owing to the mechanisation of the army and the fact that India is breeding her own horses, is quite erroneous.

India requires about 3,000 horses every year for the army, while the native States require another 1,500. In addition, there is a large private demand for polo ponies and horses for sporting and utility purposes.

Australian stations, General Anderson considers, must continue to breed horses for home use, and the surplus can be exported to India. The quality of the remounts needs, however, to be improved, as there has been a serious decline in the standard in recent years.

An Argument for "Safeguarding."

"Last year a friend of mine sold 5,000 tons of rags. He told me that these rags would be made into cloth by skilled men in Poland who were receiving from 13s. to 15s. a week. If any hon. members opposite were in business, could they say how they would compete with that country if they were having to pay £3 per week to men doing the same kind of work? A man in my division who has a woollen mill comes to London and buys certain materials. The man in France also comes to London for the same purpose. The freight charges from London to Roubaix are more than they are from London to the West Riding of Yorkshire. In Roubaix they have their mills well equipped; rebuilt out of reparations since the war. The mills are well fitted up and they employ workmen who are probably as skilled as the workmen in Yorkshire. That is the reason why we cannot compete with them. Simply because in Roubaix the worker in the woollen mills receives a standard rate of £1 2s. 11d. per week, while for the same work in the Dewsbury and Batley area in the West Riding of Yorkshire the standard wage is £2 14s. 10d. Can the House say this is a fair and reasonable competition?"—Mr. C. V. Gibson, M.P., in the House of Commons.

Silage for Sheep—Some Feeding Points.

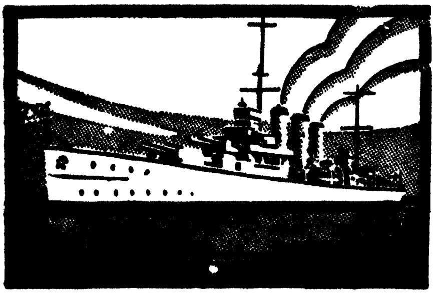
Although silage is one of the best substitutes for green grass and a reserve of it is of great value in a season such as the present, a certain amount of disappointment is sometimes expressed by those who are feeding it for the first time. Writing to the Department of Agriculture recently, a sheep-owner stated that he had been feeding silage with lucerne hay, but that the sheep showed a marked discrimination in favour of the lucerne, and if they picked up a bit of silage immediately dropped it again. He had been feeding it for four or five days.

Such an experience is by no means unusual, stock apparently having to acquire a taste for silage. To begin with, only a small quantity should be fed to sheep in a small paddock, and it is best to feed it out in the evening, for if large quantities are put out in the morning and the sheep do not at once take to it, it will dry out in the hot sun in a few hours and be wasted. Once the sheep become accustomed to silage they greatly relish it and will follow the wagons when the silage is being carted out.

Although sheep are often satisfactorily fed on silage alone, continued feeding on silage exclusively results in loss of condition, the feed being lacking in protein. It is therefore preferable to feed silage in combination with a small quantity of wheaten, oaten, or lucerne hay—especially the last mentioned, because of its high protein content.

Feeding should be commenced while the sheep are still in good, strong condition, and while there is some rough grass about. The silage need only be thrown over a clean piece of ground, but it should be well spread out, and it is best to get a good deal out every day before the sheep are allowed to feed. The sheep should be drafted into lots according to their strength.

A plentiful supply of salt should be provided for sheep when feeding on silage, even in districts, such as salt-bush country, where it is not ordinarily used to any extent. The lick is improved by adding about 6 oz. of Epsom salts to about 100 lb. of coarse salt.



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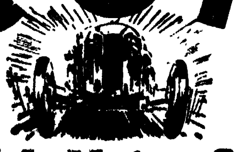

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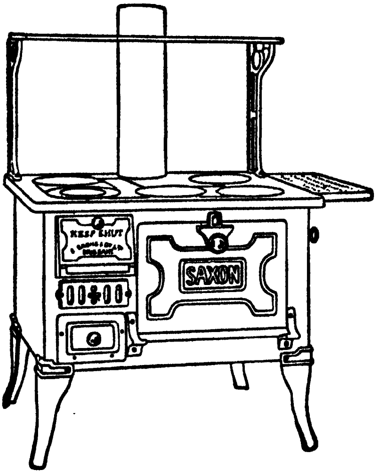

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The Home and the Garden.

OUR BABIES.

Under this heading a series of short articles by the Medical and Nursing Staff of the Queensland Baby Clinics, dealing with the welfare and care of babies, has been planned in the hope of maintaining their health, increasing their happiness, and decreasing the number of avoidable cases of infant mortality.

THE MENACE OF BAD TEETH.

The enamel which caps our teeth is the only surface tissue which is never renewed. Once injured, it can never be repaired. A crack or hole in the enamel is an open gateway for bacteria, which enter and destroy the teeth. The tooth decays, and becomes offensive; decayed teeth cause inflammation, abscesses, and open sores, which do not heal over until the teeth fall out, or have been extracted. We might imagine that nature had been careless, in leaving this part of our bodies vulnerable and defenceless. But our teeth are formed on the same plan as those of other animals, whose teeth continue good throughout their lives. Prehistoric man had excellent teeth from infancy to old age, and many primitive races have the same to-day. Bad teeth, on the other hand, are becoming almost universal in modern civilised man, and in all primitive races as soon as they adopt civilised customs in food. We may say that they are the result of civilisation, or more correctly, of some defects of our civilisation which need amendment.

Modern medicine is becoming more and more impressed with the dangers of bad teeth. The miseries of toothache are well known, and the abscesses of the jaw that may be caused by decayed teeth are serious troubles. But far more serious is the poisoning of the system by the constant swallowing of the agents and products of dental decay, to which may be attributed many cases of dyspepsia, gastric, and duodenal ulcers, and appendicitis. Septic teeth may be the original cause of septic tonsils which need surgical removal. Recently that fatal disease, pernicious anaemia, has been traced, if not with certainty, at least with much probability, to the same cause. With still more confidence do we point to dental abscesses as frequently the root cause of crippling rheumatism. Medical men are becoming more and more inclined to attribute some obscure heart troubles, nervous troubles, and other mysterious conditions to the same source. Even cancers of the mouth appear to be more frequently in dirty than in clean mouths. Gradually, we have come to recognise bad teeth as one of the chief causes of disease.

Causes which act slowly, and at a long interval of time, are apt to pass unrecognised. Careless neglect of the teeth of a child may, and often does, lead to the death of a man or woman in the prime of life, or to such crippling as leads to chronic invalidism. Now that we are coming to recognise the cause of these disasters, after the mischief is done, surely we shall endeavour to save our children from such a fate by removing the cause. Certainly, owing to the occurrence of toothache, which is one of the greatest blessings ever bestowed upon mankind, we have learnt to some extent, with the help of the dental profession, to care for our teeth. But it would be better still to preserve our children's teeth by natural methods, as they were preserved in primitive man and the lower animals.

To Grow Good Teeth Right Foods are Necessary.

Weakly developed teeth do not necessarily decay. This is a fact established by dental observation. Nor do strongly developed teeth necessarily escape destruction. This also is well established. But other factors being equal, teeth of weak construction are more easily destroyed. For the growth of strong teeth, two things are necessary. The first requirement is a sufficient supply of food containing the necessary vitamins. The most important vitamin-containing foods are uncooked vegetables, fresh fruit, fresh milk, eggs, and butter.

These foods are necessary for the child-bearing mother that her baby may have good teeth. They are necessary also for the child after his first year in order that his permanent teeth may be strongly developed. For the first year of life—the most important period for the development of the permanent teeth—nothing is so good as the mother's milk.

Nipped in the Bud.

The second requirement is sufficient space in the jaws for the developing tooth germs, the avoidance of undue pressure and overcrowding. It is for this reason that the preservation of the temporary teeth of children is so important. If a temporary tooth is allowed to decay early and become lost, the adjacent temporary teeth tend to fall together. The developing permanent teeth beneath them have then insufficient room for strong development. They may emerge out of place and overlap, so as to be useless for mastication. Another frequent cause of malformation is poor and restricted development of the jaw bones, with crowding of the developing teeth. It is often forgotten that bone is a living tissue, constantly altering its form, as it reacts to strains and stresses, and that this is more especially true in the growing child. Most serious deformities of the teeth may result from nasal obstruction, accompanied by narrowing of the jaws, and high arched palate-bones, or from the constant pressure caused by habitual sucking of the thumb, or fingers, or dummy. Still more common is the arrest of development, owing to want of use, more especially the want of hard biting. Most unfortunately, most of the foods we give our children are too soft, and those that are not soft, such as crusts of bread and meat, are tough and not hard. Tough foods have to be chewed; hard foods have to be crushed, and it is the powerful crushing muscles that exert the greatest force in widening the growing jaws. The baby should be given hard, crisp, baked bread, which may or may not be toasted (bread toasted without being baked is only hard on the surface) instead of soft bread and butter, hard baked oatcakes sometimes instead of soft porridge. Breakfast foods are valuable in porportion to their hardness and crispness, and porridge may be improved by the addition of a large spoonful of prepared bran. Of course the baby must be taught by degrees how to bite his food. As soon as he is old enough he may be encouraged to nibble a piece of raw apple at the end of his meals. In narrow, poorly developed jaws the developing germs of the permanent teeth, which lie closely packed between the roots of the temporary teeth, have not sufficient room for healthy growth. Literally, not metaphorically, they are nipped in the bud. They emerge weak and are easily destroyed. And so, from want of hard biting, we grow teeth that will not bite. For older children cracking nuts and crushing their kernels (within reason and moderation) is a valuable exercise for the jaws, and so is the biting of sugar-cane. Indeed, for dental purposes sugar-cane may be regarded as a fruit, the sweet acid juice being beneficial and the exertion needed for its extraction entirely wholesome. Perhaps in some future generation (most of the present generation are, alas, incapable of such feats) our school children will enjoy ten minutes interval every morning for nut-cracking and cane-biting, and every child who cannot crack his nuts, or crush his sugar-cane, will be referred to the school dentist for treatment.

Let us grow as strong teeth as we can, but whether strong or weak, let us preserve the teeth we have.

BOUGAINVILLEA.

Anyone visiting the beautiful garden of Mr. Thomas, at Indooroopilly, again this year, will be impressed with the many possibilities of design and effect that can be made with this very hardy and showy climber. The appreciation of the bougainvillea is shown by the hundreds of persons who go to see it in bloom. It is a hardy plant, and loves sunshine, and there is no reason why it should not be more widely grown. A little time and patience will amply repay anyone who contemplates its culture. Cuttings strike readily as soon as the blooming period is over. They should be about 12 in. long. Select last season's growth, and plant in sandy soil in a shady place.

Put the cuttings about 6 in. deep in the soil, and press down firmly. Keep the ground moist, not soaking wet. If you require a more immediate result, obtain plants from the florists in pots. There are about seven different colours to select from. When the plants have grown to a height of 2 ft. then select your design and prune accordingly. To train the plant make a skeleton design of wire, and then trim the plant by removing all shoots that may be growing in a direction that is not required. About May or June pruning must be stopped, as all the new shoots then appearing will be flowering shoots. As soon as the blooming period is over commence pruning again to still improve your design.

There are many methods of growing bougainvillea, and one that finds favour with many is that of planting it around an old tree that is not wanted, and ringbarking the tree when the bougainvillea is firmly established. It will then hang down from the branches of the tree and form a beautiful garland of bloom. It is an evergreen and never appears unsightly.

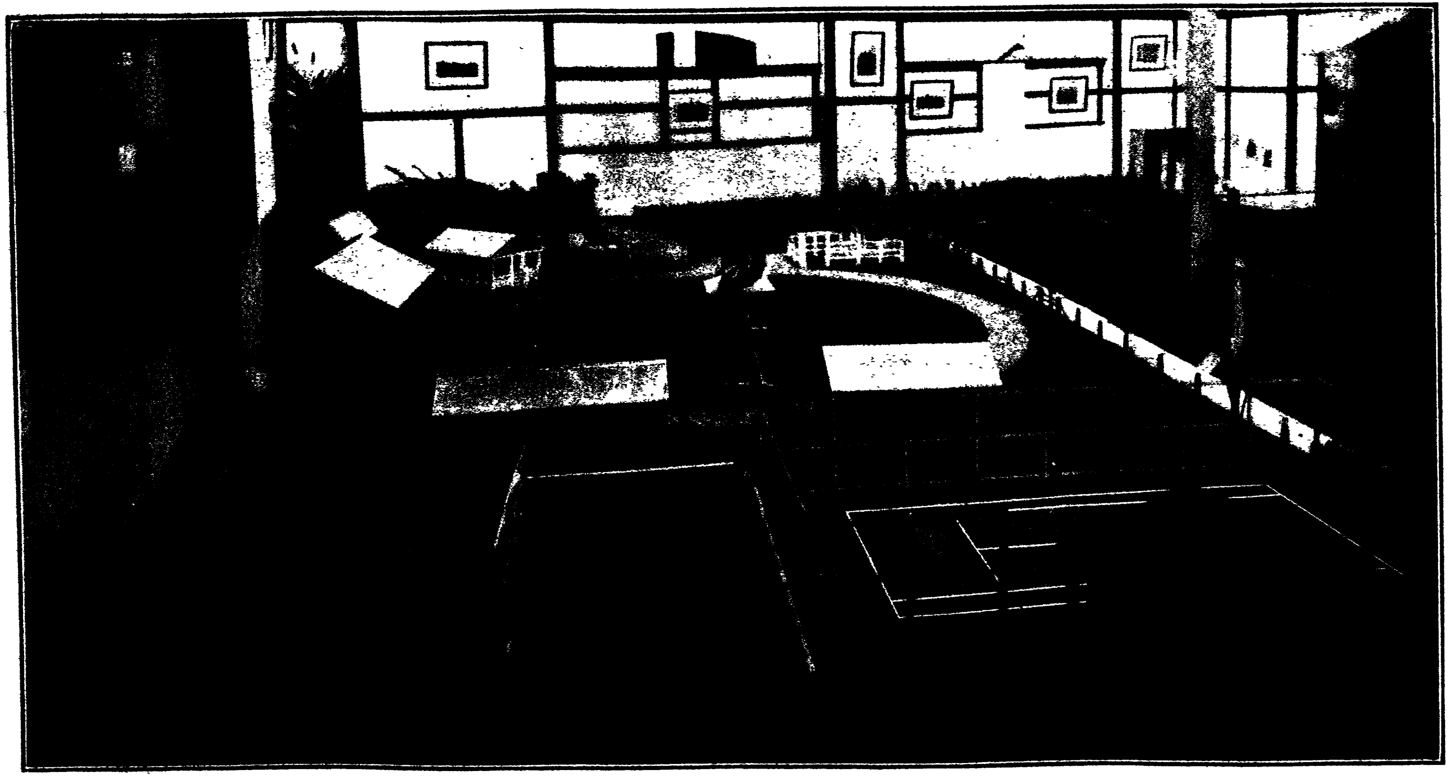

Plate 168.—A Lay-out of a Modern Farmyard—A Model Homestead in the Rural Schools' Display. Royal National Show, 1929.

PLATE 169.—ANOTHER VIEW OF A MODEL FARM HOMESTEAD IN THE RURAL SCHOOLS' DISPLAY. ROYAL NATIONAL SHOW, 1929.

PEOPLE AND GARDENS.

"*It depends on the mood of the man, whether he shall see the sunset or the fine poem.*"

In the garden among the flowers, I have learned the value of work, for it is only by working, planning, and planting, "sowin' things, an' growin' things, an' watching of 'em grow" . . . . that we obtain any results in the garden or learn anything about the flower world, and how to get them to grow.

We prepare the soil, sow the seeds, water them, and in due time are rewarded by little soft, green shoots thrusting their way through the earth, and then there is the joy and wonder in the final and lovely harvest of glorious leaf, bud, and blossom.

I have learned the value of prayer in my garden, the value of good, strong thoughts that working in a garden and among flowers must necessarily bring. Every green thing that grows in the flower-patch was a prayer when I planted it, as I looked forward to its lovely future, picturing it in its gay beauty, and in the bud, blossom, and fruit of it, I see the realisation of my prayer.

The beauty of nature, and the significance of it touches different people in different ways. Some understand it, and because of this understanding, they find in it a great love and joy, pleasure and profit. Others remain perfectly or imperfectly oblivious to it, and are quite unconscious of the fact that they are missing anything, accepting the sunshine, the air, the sky, fruit, and flower as a matter of course, and just as a very ordinary fact of creation.

Nature acts differently on many of us, making great writers of some, great poets and artists of others; and then there are others who are content and happy to make a garden, and fill with flowers. But it makes good and strong men and women of all of us, if we allow it to enter and ennoble our daily life and existence . . . but how many of us do not?

Some people understand and comprehend nature in an indefinable and aching longing to possess a garden filled with flowers, others are content to admire the flowers, pick them and decorate their house with them, while there are others who even find a joy in flowers from a florist's shop . . . . and then there are some who have not the money to buy them, and yet find a certain longing fulfilled in gazing at the flowers for sale in the window of a flower shop, or even by gazing at lovely gardens on the way. Some people who have no garden space, try to grow flowers in pots or on window ledges, but wheresoever we may go, we will see the urge of nature expressing itself in different ways.

The actual possession of a garden gives one more joy than we realise, until we have become the owner of one and worked and walked in it. It raises us to higher things, cultivating habits of observation, and not only habits, but powers of observation too, for it is only when we have worked among the flowers, planted them and grown them in the sweet-smelling earth, that they begin to whisper their secrets, and we hear the "still small voices" of nature whispering on the breeze. It gives us a healthy interest, a love of the beautiful, and the power to appreciate the great growing world outside, and teaches us to realise and grasp the joy that life can give.—ENID, in "The South African Gardening and Country Life."

CONTROL OF WEEDS ON LAWNS.

Weeds in lawns and on bowling and golf greens cause considerable annoyance and trouble, and are often difficult to control, especially if proper precautions have not been taken from the outset. As a rule, most trouble is experienced on lawns and greens which have not been properly drained, or which are shaded, or where the soil has not been enriched before laying down the grasses. It is obvious, therefore, that control of weeds in such places must be kept in view from the time that the lawns are being established.

In the case of bowling-greens and golf greens special care should be exercised to see that they receive direct sunlight throughout the whole of the day, particularly during the winter months, and also that they are thoroughly drained by means of agricultural drain pipes placed below the ground. The soil should also be enriched either by adding a better class of soil or by heavy dressings of well-rotted animal manure. If these precautions are adopted and high-grade seed, free from weed seed, is sown thickly, little trouble will be experienced from weeds. Subsequently, a vigorous growth of the grass should be encouraged by frequent watering and by top-dressing with well-rotted animal manure composted with soil.

When such dressings are being made, care should be exercised to see that all weed seeds have been destroyed in the compost. This can only be done by composting the soil and manure in heaps which can be kept under observation for some months. If it is not possible to ensure that the composts are free from weed seed, it is preferable to use artificial fertilisers for top-dressing.

Despite the greatest care that is taken, however, weeds will occasionally appear in lawns, and they must be immediately hand-pulled. If care is exercised in this direction, no great difficulty will be experienced in keeping the weeds under control. Clover is often troublesome in lawns, and this can be checked to some extent by top-dressing with sulphate of ammonia, which does not encourage the growth of clover, but stimulates the growth of grass, which checks the clover.

Superphosphate and lime should not be used on lawns which are likely to be infested with clover, as they stimulate the growth of clover.

Chemical exterminators cannot be recommended to any extent for control of weeds on lawns, but they can be used, particularly arsenic preparations, for killing individual plants such as paspalum grass. A little of the preparation should be dropped on the middle of the plant.

THE FARM HOME.

PURITY OF FOODSTUFFS—SOME SIMPLE TESTS.

Thanks to the efforts of the authorities that are responsible for the purity of our foodstuffs, the adulteration of commodities is not so common as in the past, says the "Journal of Food Industry," London. Unfortunately, however, impure foods are still on the market. The following tests will enable buyers to determine if the foods they are receiving are pure or otherwise.

The expert coffee taster can tell by simply tasting the beverage if chicory has been added, but to the ordinary consumer this would not mean much. An infallible test is to place a teaspoonful of the dry coffee in a tumblerful of cold water, stir well with a spoon, and leave for a minute or so. If the water remains clear the coffee is pure, but if it takes on a brownish tint chicory has been added. The darker the brown tint the greater the amount of chicory that has been added.

To test the quality of sugar, burn a sample in an aluminium spoon over a gas jet. If the sugar burns away entirely, it is pure, but if any ash remains adulterations have been added.

The best way to test olive oil is to pour a quantity into a small bottle, add an eighth of the quantity of household ammonia, and shake well. If the mixture assumes a milky mass the oil is pure, but if it has a granulated appearance other oils have been added.

The simplest test for butter is to place a little in a spoon and hold it over a gas jet. If the butter boils evenly it is pure, but if it splutters and a scum appears margarine has been added.

To test flour, press a sample in the hand; if, when the hand is opened, the flour retains the impression of it and appears slightly yellow it is pure, but if it falls into powder and retains its usual colour adulterations have been added.

A good way to ascertain if milk has been "creamed" is to skim it after it has stood for an hour or so. If after the skimming a slightly bluish tinge appears round the edges, the milk is all right, but if the edges appear as before, the milk has been "creamed." To test if water has been added to the milk dip the point of a well-polished needle into it, and withdraw, holding the needle perpendicular, with the point downwards. If the milk adheres to the point it is pure, but if all of it drops off water has been added.

THE GARDEN SPIRIT.

Quoting the words of him who coined the phrase "The Garden with a Soul."—"Each year provides a novel interest with something different to look at in addition to one's old loves!"

Says Shakespeare: "I doubt this garden lacks no flowers to make a garland of, in any season." It is a place for strengthening a weary spirit, for dreams and fancies where the murmur of a stream, the hum of the bees, and the song of the birds fill the air with their music. Francis Bacon said: "It is nothing for great princes (the wealthy) that for the most part, taking advice with workmen, with no less cost set their things together for state and magnificence, but add nothing to the true pleasure of a garden." "God Almighty first planted a garden and, indeed, it is the purest of human pleasures; it is the greatest refreshment to the spirits of man; without which buildings and palaces are but gross handy-works." Bacon was writing of no ready-made thing, filled with masonry, when he penned the famous words—"Whoever owns a garden has one chamber roofed by heaven, in which the poet and the philosopher can feel at home. An increasing happiness—a little pleasance of the soul by whose wicket the world can be shut out, and where something of the Golden Age lingers."

Such a garden as this will, like Shakespeare's "Rosemary and Rue," keep its seeming and savour, and ever be to all who enter it—"Full of Grace and Remembrance."—"The South African Gardening and Country Life."

MARKET GARDENING.

JERUSALEM ARTICHOKES.

This valuable plant seems to be little known in Queensland, and still less grown and used, and yet it is an excellent esculent for man as well as a first-class food for domestic animals. The stems, leaves, and flowers bear a great resemblance to the well-known sunflower of the same family.

The plant is propagated by tubers. It is not at all exacting as regards soil, and will grow in almost any situation, excepting low-lying, ill-drained soils. The best crops are obtained from rich, friable, sandy loams. The cultivation is extremely simple, and does not require any extra care or skill. The land should be turned as for potatoes—that is, deeply ploughed and thoroughly pulverised. The smallest tubers are planted in the same manner as potatoes. Hilling up is not essential, but it is an advantage to mould over the soil at each cultivation. The tubers are very difficult to eradicate, consequently they should be put in some situation where they are not likely to prove troublesome. Four to five cwt. of tubers will plant an acre.

The tubers should be ready for digging in from four to five months. If not required for immediate use, they may be left in the ground and taken up at any time. If dug, they will not keep very long, without shrivelling up and becoming soft, but may be kept for a time by packing in layers of fine soil, sand, or ground charcoal if these substances are in a dry condition.

ASPARAGUS.

This plant is a perennial, and a native of the seashore, thriving best in soils containing a large proportion of sand. However, the rich alluvial soils of river flats should produce asparagus of large size and good quality, therefore their composition may be imitated in preparing garden soil for this culture. Although asparagus can make use of large quantities of water when growing, it requires a well-drained soil, for anything approaching stagnant water is fatal to the plant. Asparagus may be propagated by root divisions; it is preferable, however, to raise the young plants from seed sown in early spring, allowing them to remain in the seed-bed for at least two years. As soon as the roots are large enough, they may be transferred to their permanent positions, the soil of which should be previously well trenched and manured. The best results, under local conditions, will be obtained by making a drill of sufficient width, and about 6 inches in depth, with a slight ridge in the middle; the root should then be carefully lifted and trimmed of any damaged parts, and set in the trench saddlewise, with the point of the roots tending downwards. Cover to a depth of 3 or 4 inches, and firmly press the soil about the roots; where possible mulch with a thick coating of stable manure. During the early stages of growth it will be found advantageous to give copious watering during dry periods. The first growth is allowed to seed, the tops being cut down when they begin to show signs of yellowing. The mulch can then be lightly forked in, and during the winter a fresh supply may be applied. In these operations the depth of soil may be slightly increased over the roots; this will ensure long blanched heads of fine appearance. It is not advisable to cut too many heads until the third year, and cutting should cease in good time, in order to avoid the premature exhaustion of the plant. Sufficient tops must be left to mature, and thus stimulate the growth of the plant in general. The variety recommended for general use is Connover's Colossal.

FRENCH BEANS.

A considerable variety of beans are grown in Queensland. As far as market gardening is concerned, the principal sort is undoubtedly Canadian Wonder. This French bean appears to suit our conditions to a greater extent than any other, and produces good, long, green pods in great profusion.

As French beans are one of the crops that pay, some attention must be given to the preparation of the land. Market gardening at all times demands good cultivation, and the free use of well-rotted stable or other manures. To apply a heavy coat of such manures to land in which it is intended to grow French beans will, in most instances, induce the plant to produce a lot of foliage, and consequent loss of bean pods. It therefore follows that the land should be in good heart, and preferably that which has been heavily manured for a preceding crop. If this is impossible, a light dressing of artificial manures, rich in phosphates or potash, will have a beneficial effect. The usual practice of planting is to strike out shallow drills and drop the seed by hand, covering them up with a light harrow. It is possible to adapt a maize-planter, by fitting it with a special plate, thus saving a considerable amount of labour. The one idea before every grower should be to limit the area to that which he can keep free from weeds, and not so big as to be neglected during picking time. In order to get the most out of the plants, the beans must be gathered as they become fit—that is, when young and tender—otherwise they will begin to form seed and cease to bear marketable beans.

The Chinese gardeners are most particular as to the quality of the bean seeds they purchase, and it is well to note that seed grown in Queensland often contains bean weevil. These beetles lay their eggs on the growing crop, and their presence is not noted until after the crop has been harvested and threshed. As diseased pods and stems left on the ground will provide infection for the new crop, it is desirable to collect and burn all such refuse, and sow clean seed only. Any seed affected with insect attack should be rejected.

In many parts of the State it is difficult to raise a good crop during the hot summer months, owing to the ravages of a small fly, the grubs of which travel in the stem. These can easily be found if the skin of a beanstalk be carefully peeled with a sharp knife. There is not any known commercial remedy, but the hilling up of the stems with soil will often be found to be effective. Strict attention, as stated, must be paid to the destruction, by burning, of all plants immediately a crop is harvested, also of those which show signs of wilting during growth. Rotation of crops must be practised where this trouble manifests itself.

It is as well to note that horse work should not be started in the early morning, when the crop is wet with dew, neither should it be attempted after a shower. Sufficient time should elapse to allow the plants to dry, otherwise the spores of some diseases will be easily scattered, the rainy season being the most favourable time for their spreading.

The principal varieties suitable for market are Canadian Wonder and Burpee's Stringless Greenpod.

LIMA BEANS.

These are often called shell beans, as the part cooked is the seed in its green state. When harvested they are in good demand, the dry beans being soaked in water for a few hours and then cooked as haricots. As the Lima varieties succeed in dry, hot weather, the extension of their culture will no doubt be made, as soon as growers and buyers are more acquainted with their use. They do not require any special culture or attention; if kept well picked they will produce pods for a considerable time, provided that the crop is on fair soil and kept cultivated and free from weeds.

BROAD BEANS.

Broad beans may be grown in the cooler parts of Queensland, doing well on heavy land. Unlike French and Lima beans, they easily respond to nitrogenous manure. Being a winter crop, they will not require as much cultivation as French beans, and under suitable conditions will prove a paying proposition. Their cultivation on a large scale, however, is not recommended unless a ready market is available.

From May to June is the best time to sow.

BEETROOT.

Good beetroot may be grown in almost any kind of soil, provided that it is well broken up, and not of too stiff and clayey a nature; but the best beets are produced in fairly rich, dry, sandy loam soils. As in the case of the carrot and parsnip, fresh, new manure should never be used for beetroot. If manuring is necessary, it should be done some time before the seed is sown, and be well mixed with the soil. The seed may be sown for the winter crop in February or March, and for the summer crop in August or September; or, by sowing a little every six weeks or so, a constant supply can be kept up all the year round. When thinning the plants, any blank spaces which may occur in the rows can be filled up, as beet stands transplanting well.

Varieties recommended: Crimson Globe and Egyptian Turnip-rooted.

CABBAGES AND CAULIFLOWERS.

Most of our cultivated vegetables and fruits have originated from comparatively worthless beginnings, and there is no more striking example of what can be accomplished by means of cultivation than is presented to us by the cabbage and cauliflower—in fact, by most of the cultivated plants of the cabbage family. It has, of course, been a process of evolution for hundreds of years, by hybridisation and by selection, that the fittest have survived and to-day exist in their present useful form.

Cabbages.

Under certain conditions, cabbages can be grown in most parts of Queensland. They naturally, however, come to the greatest perfection in the colder districts. The conditions which best suit the cabbage are: A rich soil, deep cultivation, and plenty of water, besides thorough after-cultivation. If the soil be not naturally rich, it must be made so by working in quantities of good well-rotted stable and cowyard manure, and the soil fertility can also be still more increased by adding some dried blood manure. The first thing to be done, however, is to prepare a seed-bed, as already explained. Then sow the seed in drills about 1 foot apart, and cover them by shaking fine rotted manure or fine soil over them. Give the plants plenty of water as soon as they appear above ground, shading them, if possible, but do not keep them constantly covered, or they will grow up weak and spindly. In about four or five weeks they should be ready for planting out. This operation should, if possible, be done in showery, or at least in cloudy weather. If the ground is dry at transplanting-time, a little water should be used to prevent the soil falling into the hole made by the dibble.

Before taking up the young plants, soak the seed-bed thoroughly, so that the former may be raised with little injury to the roots. If there be any aphis or grubs on the plants, plunge every part of them *except the roots* in tobacco water. Trim off about half the leaves, as these would drop off and decay in any case, but before doing so would act prejudicially by using up the moisture in the ground.

When the plants are taken out of the seed-bed, place the roots at once in a puddle made of soil and water, in the bottom of a bucket, so that when carried out on to the field, the roots may not be exposed to sun and wind. The handiest implement for planting is a wooden dibble, made out of the handle of an old spade or fork. Some care must be taken in putting in the plant. The hole made by the dibble should only be deep enough for the plant. See that the roots reach the bottom, turn in a little soil, and then draw the plant slightly upwards before pressing the rest of the soil firmly round it. This ensures that the main root will not be doubled up, which would have a bad effect on the maturing plant. Should dry weather continue, constant watering will be necessary, but by the use of mulch the labour of watering will be considerably lessened. A well-grown cabbage will occupy a space of about 2½ feet; therefore give plenty of room. Leave 3 feet between the rows each way for the large varieties, and 2 feet for the smaller ones. To avoid the trouble of hilling up, the plants may be set in the bottom of a shallow furrow. Thus they are to some extent protected from the sun, and will not require hilling up, as the gradual filling up of the furrow during subsequent cultivation will do all that hilling up performs, and do it better.

The great secret of success in cultivating plants of the cabbage family is to *keep them constantly growing*, and never allow them to be checked by any cause whatever. Keep them on the move by regular cultivation, and plenty of water. About twice a week give them a watering of liquid manure, which will help greatly to promote rapid growth. Insect pests are most troublesome when plants are checked in their growth from some cause or other.

If cabbage plants take too long to mature, the heads, instead of being tender and succulent, become tough and leathery. Good tender cabbages should only take at most four months to be ready for the table. To ensure success, keep the ground clean, and conserve the moisture by constant cultivation. Do not wait till you see weeds to cultivate, but do it after every shower of rain, until the plants get too large to allow of implements being used among them. In the cooler parts of the country, cabbages may be grown all the year round, but in the warmer districts it is hardly worth while growing them in the summer months, as there are so many insects and other pests to contend with that a great deal of the profit is lost in keeping the plants clean.

Cabbages derive much benefit by the application of lime to the soil every second year, using either slacked lime or pulverised limestone, at the rate of 15 and 30 cwt. per acre, respectively.

In the warmer districts, the first sowing may be made in January or February, and then, at intervals of a month or so, up to August or September.

The varieties most suitable for marketing are Henderson's Succession, Burpee's Surehead.

Cauliflowers.

Cauliflowers thrive during our coldest months, and should, therefore, be planted out in time to ensure their heading in that season. The best time for sowing the seed is between the middle of February and the middle of March, as cauliflowers occupy the ground from five to six months, and should be in head in the coldest weather. If any is sown after April, it must be an early variety, which will mature before the weather gets too hot. The seed is sown in the same way as cabbage seed, and the planting out is also done in the same manner, but more care is required in transplanting than in the case of cabbages. The soil must be of the richest, and cauliflowers do better in virgin soil than elsewhere, provided the ground is thoroughly dug over to a depth of 15 inches and well pulverised. Cultivation should be thorough and fairly deep until the plants begin to head, or until the leaves spread so much that they are liable to be broken by the cultivating implements. As soon as the heads begin to form, cultivation may cease, because, if still carried on, there is a tendency for the heads to grow loose and coarse, instead of firm and compact. At this stage water is more essential than ever, and a good watering with liquid manure twice a week will add greatly to the bulk and quality of the crop.

It should always be borne in mind that the market value of cauliflowers depends entirely on their being of fair size and *white* and tender. To secure the whiteness of the head, as soon as the heads begin to form the leaves may be drawn together at the top and tied or skewered over the heads. This will protect them from the sun and cause them to be properly blanched.

When cutting the matured plants, the work should be done early in the morning, while the dew is on them, as they keep fresher for a longer period than if left till the sun gets hot.

The following indications will show when a head is ready to cut:—

The leaves bulge out considerably at the base, and the head begins to lose the polished smooth appearance which has hitherto characterised it, and becomes grained and somewhat irregular. To examine the head, it is not necessary to untie the top leaves, but part them at the side, so that, if not quite ready, cutting may be deferred until the next day. Cut with 2 inches or 3 inches of the stalk, and two or three circles of leaves.

Handle very carefully, and take care not to bruise the heads in any way, as even a slight bruise soon becomes black, and this detracts greatly from the market value. It is said that cauliflowers may be preserved for some time after the crops are over by attention to the following directions:—

Pull the plants up by the roots a day or two before they are ready for cutting. Tie the tops of the leaves loosely together; then place them in a cool shed; cover the roots with damp sand or sandy soil, and the heads will keep quite fresh for several weeks.

Cauliflowers should never follow a cabbage crop, nor be grown two seasons following on the same land.

The varieties recommended for market gardening are:—Primus, Eclipse, Early Italian Giant.

Insect Pests.

Both cabbage and cauliflower are subject to the attacks of insect pests, which either eat the heart of young plants right out or riddle the leaves, and render them unsightly. Paris green sprayed on the plants immediately the larvæ are discovered will destroy them. Aphides are a great source of trouble, and should be promptly dealt with. Weak kerosene emulsion or tobacco water will destroy aphides easily. It should be borne in mind that Paris green, being an arsenical poison, must not be used on crops of this kind within five or six weeks of their being ready for market.

Farm Notes for November.

FIELD.—Farmers are commencing to realise that quick-manuring wheats which possess a degree of rust resistance are more dependable than the slow-growing and often rust-susceptible kinds, which are gradually giving place to these and mid-season varieties.

Growers are advised to make every preparation to work up the surface of the ground immediately after the removal of their crops, so that the soil may be put into good condition to receive any rain which falls, the conservation of which is the best guarantee for the success of the next succeeding crop. Such initial preparation also encourages the early growth of all foreign and weed seeds, and permits of their eradication by the implements used to produce the desired soil mulch. In such manner paddocks are kept clean and the purity of crops is maintained. The careful preparation of areas intended for maize-planting cannot be too strongly impressed upon growers. Deep and thorough ploughing, followed by cross-ploughing and subsequent cultivation of the soil, must precede sowing if success would be attained; and all efforts must be concentrated to obtain a good surface mulch. Failure to follow up the subsequent sowings by harrowing prior to the appearance of the young plant conduces to weed growths and very often entails, by neglect of this operation, subsequent hand-hoeing between the plants in the drills. Harrowing should be discontinued before the plant breaks through the surface, otherwise damage will accrue to the tender shoots of the young plants. When the young maize plant has hardened up it may, with advantage, be lightly harrowed in the direction of the drills, but such practice must discontinue once the plant has attained a height of 6 inches. Close cultivation by inter-row cultivation implements is necessary after every shower to conserve moisture and to prevent weed growth, care being taken to ensure each cultivation being shallower than the preceding one, and so prevent damage to the root system of the plant, which is extensive. Inter-row cultivation should cease with the advent of the cob on the plant; and, if proper attention has been given to the crop, it should, at this period, be unnecessary. Where crops are planted on the check-row principle, inter-row cultivation is facilitated, and more even crops result.

The French millets (red and white), owing to their rapid maturing qualities, form excellent intermediate or supplementary crops, and are suitable for present sowing. Their value for fodder and seed purposes is worthy of more general recognition at the hands of the average farmer.

Past dry periods have impressed upon us the necessity of providing during good seasons against the return of less favourable ones, and in this connection the cultivation of quick-growth fodder plants appeals to us. Many varieties of useful classes of fodder can be cultivated over a large portion of this State; chief of which, perhaps, are the sorghum family for grain and fodder purposes. Of the latter, Sudan grass has much to commend it, and is fast becoming one of the most favoured by stockowners. Grain sorghums, of which Feterita, Red Kaffir, and the various Milos are examples, should occupy a more prominent position for purposes of horse and pig feeding, and are particularly suited to those localities which are unsuitable for maize production. Some varieties of sorghums have strong frost-resisting qualities, and lend themselves to those localities where provision for some form of succulent fodder is necessary during the winter months.

Orchard Notes for November.

THE COASTAL DISTRICTS.

November is somewhat of a slack month for fruit in the coastal districts, as the citrus crop, excepting a few Valencia Late oranges, off-season lemons, and a few limes, is over. Pineapples are also scarce, as the late spring crop is finished, and there are only comparatively few off-season fruits ripening. The main summer crop of fruit in the principal producing districts is only in the flowering stage, though that in the more tropical parts is ready for marketing. It is also a slack month for bananas, as the summer fruit is not yet fully developed, and the bunches that make their appearance are usually poor. They have been slow in developing on account of the comparatively cool weather of winter and early spring, when the suckers were more or less at a standstill. Young suckers should, however, be making vigorous growth now, and the plantation will require constant attention to prevent the stools being overcrowded with too many suckers. Keep the land well worked and free from weeds of all kinds, as good growth now means good bunches in the autumn and early winter. Where there is a danger of the soil washing badly with heavy rain, rows of Mauritius, velvet, or other suitable beans should be planted at right angles to the fall of the land, as the growth they make will tend to hold the soil, and thus save any from being washed away. When planting beans of any kind, either to prevent washing or for green manuring, don't forget to manure them, as thereby you will get a much greater yield, and as none of the manure is removed from the soil, as the crop is allowed to lie and rot on the ground, it is all made use of eventually by the permanent crop.

A good all-round manure for a bean crop is a mixture of 1 cwt. of sulphate of potash and 4 cwt. of basic superphosphate or finely-ground phosphatic rock to the acre, and, if the soil is deficient in lime, a dressing of not less than half a ton to the acre will be found very beneficial, as all leguminous plants require lime to yield their maximum return both of haulm and pulse. The pineapple plantations require to be kept in a state of thorough tilth, and no weeds must on any account be allowed to grow. If blady grass makes its appearance it must be stamped out, as once it gets established in the rows it is only a short time before it takes control, and the plantation is ruined, so that it can only be brought back into profit by taking out the pines, killing the blady grass, and, after thoroughly and deeply working the land, manuring it and replanting.

The planting of pineapples and bananas can be continued throughout the month, taking care to see that the land is properly prepared and that the advice given in previous monthly notes is followed. Young papaw plants that have been raised in the seed bed can be set out now, as also can young passion fruit. Citrus orchards require to be well looked after; the ground must be kept in a state of thorough tilth, and if the trees show the slightest sign of distress, owing to lack of moisture in the soil, they must be given a thorough irrigation if water is available for this purpose. The trees should be carefully examined from time to time so as to note when young scale insects of any kind are hatching out, and when this is noted they should be sprayed with a weak emulsion of a miscible oil consisting of one part of oil in forty parts of emulsion, as this is quite strong enough to kill any young scales before they develop their protective covering. As stated in these notes previously, no oil sprays should be used when the trees are suffering from lack of moisture, as they are then likely to do more damage than good to citrus trees. If scale insects are very bad, and it is important that the trees are sprayed, a weak lime-sulphur spray, or even a soap and tobacco or weak resin wash, will kill the young scales as they hatch out. In the earlier districts a keen lookout must be kept for the first appearance of the mites, which are the direct cause of the darkening of the skin of the fruit known as "Maori." The first indication of the trouble is that when the sun is shining on the young fruit it appears to be covered with a grey dust, and if the fruit is examined with a good lens, it will be seen to be covered with large numbers of small yellowish slug-like insects which are living on the skin. Spraying with sodium or potassium sulphide washes, as recommended by the Department, or with a weak solution of lime-sulphur, will destroy these insects and prevent the fruit from turning black. Borers of all kinds should be looked for and destroyed wherever found. Water sprouts, if not already removed, should be cut away. Vines will require careful attention, and the vineyard should be kept in a state of thorough cultivation. Spraying for downy mildew and black spot should be continued, if necessary, as well as sulphuring to prevent oidium.

Fruit fly must be systematically fought whenever seen, and special care must be taken to gather and destroy any early ripening peaches or other fruit that may be infested. If this is done systematically by all growers, as provided by the Diseases in Plants Act, there will be many less flies to attack the later crops of mangoes and other fruits.

Leaf-eating insects of all kinds should be systematically fought wherever seen, by spraying with arsenate of lead, and potatoes and tomatoes should be sprayed with a combined spray consisting of Bordeaux or Burgundy mixture and arsenate of lead, so that diseases such as early blight and Irish blight may be prevented and leaf-eating insects, which frequently cause very heavy losses to these crops, be destroyed.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Keep the orchards and vineyards in a thorough state of cultivation, so as to keep down all weed growth and conserve moisture in the soil. This is important, as, if a long spell of dry weather sets in, the crop of summer fruit will suffer severely from the lack of moisture. Citrus trees should be irrigated where necessary, and the land kept in a state of perfect tilth. Spraying for codlin moth should be continued, and all pip fruit trees must be bandaged at the beginning of the month; further, the bandages must be examined at frequent intervals and all larvæ contained in them destroyed. The neglect to spray thoroughly and to attend to the bandages properly is responsible for the increase in this serious pest in the Granite Belt, and growers are warned that they must pay more attention to the destruction of this pest if they wish to grow pip fruit profitably. Fruit fly may make its appearance in the cherry crop; if so, every effort should be made to stamp out the infestation at once, as, unless this is done, and if the fly is allowed to breed unchecked, the later ripening crops of plums, peaches, apples, pears, apricots, and Japanese plums are bound to become more or less badly infested. Combined action must be taken to combat this, the most serious pest of the Granite Belt, and growers must realise that, unless they take this action and see that careless growers do not breed the fly wholesale, they will never keep it in check, and it will always be a very heavy tax on their industry. Rutherglen bug is another serious pest in this district, and is propagated by the million by careless orchardists. The best remedy for this pest is to keep the orchard clean and free from weeds. Brown rot in fruit should be watched for carefully, and, on its first appearance in a district, all ripening fruit should be sprayed with the sodium sulphide wash.

All kinds of leaf-eating insects should be kept in check by spraying with arsenate of lead, and all grape vines, potatoes, and tomatoes should be kept sprayed with Bordeaux or Burgundy mixture, the former for black spot and downy mildew, and the latter for early and late (Irish) blight.

SUBSCRIPTIONS TO THE JOURNAL.

Subscribers are reminded that when a cross is placed in the square on the first page of the Journal it is an indication that the term of their subscription ends with the number so marked, and that it is advisable to renew immediately if they desire the retention of their names on our mailing list.

To farmers, graziers, horticulturists, and Schools of Art the annual subscription—one shilling—is merely nominal, and the charge is only imposed to cover the cost of postage. To them, otherwise, it is an absolutely free issue. Members of agricultural and similar societies who are not actively engaged in land pursuits are asked to pay five shillings a year, while the annual subscription charged to the general public is ten shillings.

Farmers particularly are urged to keep their names on our mailing list, for through the Journal they may keep themselves well informed in respect to the activities of the Department, and other matters with which they are directly concerned. Instead of sending just the annual subscription along it is suggested that, when renewing it, they do so for a longer term. For instance, five shillings would keep their names on our subscribers' register for five years. By doing this they would obviously help to reduce clerical labour as well as avoid the inconvenience to themselves of posting annually the very small sum necessary to keep their names on our mailing list.

On another page an order form may be found, and for those whose annual subscription is about due what is wrong with filling it up now and posting it direct to the Under Secretary, Department of Agriculture and Stock?

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

					MOONRISE	
	October, 1929.		November, 1929.		Oct., 1929.	Nov., 1929.
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
1	5.35	5.49	5.4	6.8	a.m. 4.32	a.m. 4.42
2	5.34	5.49	5.3	6.9	5.6	5.6
3	5.33	5.50	5.3	6.9	5.39	5.50
4	5.31	5.51	5.2	6.10	6.11	6 30
5	5.30	5.52	5 1	6.11	6.43	7.15
6	5.29	5.52	5.0	6.12	7.16	8.4
7	5.27	5.53	5.0	6.12	7.52	8.57
8	5.26	5.54	4.59	6.13	8.36	9.49
9	5.25	5.54	4.58	6.14	9.27	10.38
10	5.24	5.55	4.58	6.15	10.13	11.40
11	5.23	5.55	4.57	6.16	11.6	p.m. 12.36
12	5.22	5.56	4.57	6.16	11.59	1.33
13	5.21	5.56	4.56	6.17	p.m. 12.55	2.29
14	5.20	5.57	4 55	6.18	1.52	3.28
15	5.19	5.57	4.55	6.19	2.50	4.30
16	5.18	5.58	4.54	6.20	3.47	5.33
17	5.17	5.58	4 54	6.21	4.45	6.43
18	5.16	5.59	4 54	6.22	5.45	7.52
19	5.15	5.59	4.53	6.23	6.47	9.0
20	5.14	6.0	4.53	6.23	7.52	10.4
21	5.13	6.0	4.53	6.24	9.2	11.3
22	5.12	6.1	4.53	6 24	10.8	11.53
23	5 10	6.1	4.52	6 25	11.13	...
24	5.10	6.2	4.52	6.26	...	a.m. 12.46
25	5.9	6.3	4.52	6.27	a.m. 12.14	1.15
26	5.8	6.3	4.51	6.27	1.8	1.42
27	5.8	6.4	4.51	6 28	1.54	2.13
28	5.7	6.5	4.51	6.29	2.38	2.44
29	5.6	6.5	4.51	6.30	3.7	3.14
30	5.6	6.6	4.51	6.31	3.39	3.39
31	5.5	6.7			4.10	

Phases of the Moon, Occultations, &c.

3 Oct.	●	New Moon	8 19 a.m.
11 „	☾	First Quarter	4 5 a.m.
18 „	○	Full Moon	10 5 p.m.
25 „	☽	Last Quarter	6 21 p.m.

Apogee, 11th October, at 12.42 a.m.
Perigee, 23rd October, at 8.0 a.m.

The occultation of Venus by the Moon on the 30th, belongs to the northern hemisphere only, and it will occur when both are far below the horizon.

When the Moon sets, about two hours after the Sun on the 5th, it will be apparently near Alpha Libri; about 8 p.m., on the 7th, it will be not far from Antares, the brightest star in the Scorpion; on the 9th, it will seem to be in Sagittarius, whose bow will be to the eastward of it; on the 11th, still in Sagittarius, past the bow, and near to Capricornus; on the 13th, still in Capricornus, but near the border of Aquarius; on the 16th, it will be near the junction of Aquarius, Pisces, and Cetus. The Moon being full on the 18th, the stars in its neighbourhood will not be distinctly seen; on the 20th, at 8 p.m., it will be apparently in Aries, but still too bright to allow the stars of that constellation to be well seen; on the 25th, at 4 a.m., the waning Moon will be near Pollux, the brighter of the Twins; when, rising about an hour before the Sun, on the 31st, it will be approaching Spica, the principal star in Virgo.

1 Nov.	●	New Moon	12 1 p.m.
10 „	☾	First Quarter	12 10 a.m.
17 „	○	Full Moon	10 14 p.m.
24 „	☽	Last Quarter	2 4 a.m.

Apogee, 7th November, at 9·0 p.m.
Perigee, 19th November, at 3.48 p.m.

One of the most beautiful astronomical phenomena is an annular eclipse of the Sun. Such an event will occur on 1st November. It will not be visible in Australia, the negroes in Africa having an almost total monopoly. Other people in Egypt and South Africa will have only a partial eclipse. In England some view of the latter will be obtained.

During the eclipse the planet Mars will be at a distance of about one and a-half times the length of the Southern Cross to the east-south-east. Eighteen hours later the Moon will pass on the south side of Mars and apparently very close to it, but in reality Mars will be more than 300 million miles beyond it.

After sunset on the 5th the Moon and Saturn, low down in the west, will be not far apart, as two hours later the Moon will pass five degrees south of the planet.

When the Moon rises on the 18th, the day after being full, the planet Jupiter will be seen to be about five degrees higher.

On the 27th, Mercury will be passing from west to east of the Sun, a little more than the diameter of the Moon from it on its southern side.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 38 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

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QUEENSLAND AGRICULTURAL JOURNAL

VOL. XXXII. 1 NOVEMBER, 1929. PART 5.

Event and Comment.

Agriculture in Queensland—A Quarterly Survey.

THE Minister for Agriculture (Hon. H. F. Walker) has received a report of conditions in the agricultural districts for the quarter ending 30th September, from the Director of Agriculture (Mr. H. C. Quodling). The report which covers a period terminating just prior to the recent rains in Southern Queensland indicated unfavourable conditions generally at the time, but these happily have now been dispelled in the southern section of the State by generous rains. On the Darling Downs the area planted to wheat was slightly in excess of that of last season, but the crop was showing distress as a result of the continued dry weather. Some of the early sown crops, particularly in the northern portion of the Downs, were being fed off by dairy cows or sheep. In the Maranoa district a number of individual crops had failed, but where attention had been given early in the season to the conservation of soil moisture, a light crop of grain will be harvested. Now that the conditions have altered, anticipated yields must greatly exceed the earlier estimate.

Maize and Fodder Crops.

FAIR average yields characterised the maize crop, which is now practically all in the bag. Large acreages have been prepared for planting to maize next season in anticipation of favourable weather, and this is in addition to a considerable area already sown. Early sown potatoes also had reached a stage when rain was urgently necessary to save the crop, and these also benefited by the timely downpour.

An increase had been noted in the areas in dairying districts planted with green fodder crops, which have proved of great value to the dairying industry. Although the dry spell had followed a very severe winter, the condition of the stock and output of dairy products had been maintained by grazing off or hand-feeding these crops. In view of the necessity of feeding off in the green state practically no fodder was conserved, and in most districts there was very little carry-over of silage from the previous season. Good draught horses were very much in demand on the Downs, and active draughts brought fair prices.

In the Northern Division.

IN the Northern Division of the State the three months period, according to a report from the Senior Instructor in Agriculture for that division (Mr. N. A. R. Pollock), proved to be practically rainless except for light falls well below the average for each month in the wet belt, Ingham to Cooktown. The grass and water were plentiful generally, but beginning to go off and much of the dry feed had been burnt in parts. The pasturage generally on the Atherton Tableland was better than usual for the time of the year, and all dairy stock and pigs were in good condition. A lowering of output is expected until the advent of the wet season this month or next. The Tableland maize crop has been harvested and this is expected to show some decrease in yield.

The potato crop has been harvested on the coastal areas and the yield was from fair to good. There has been an increase in the area devoted to this crop, also to winter growing fodders, which have already been fed off or harvested. No silage had been conserved and little or no hay made in the course of the quarter under review.

Bacon pigs and porkers were in brisk demand, both from the factory and from local butchers. Fat cattle after the meatworks season are in poor supply and prices are on the upward curve. Store cattle are in good demand, but few are offering.

Ploughing and other preparation of land is being briskly proceeded with for the sowing of crops when seasonal rains occur.

Notwithstanding that the winter was long and severe the average production of dairy produce was well maintained up till the first week in October, when dry weather generally prevailed and a shortage of fodder crops and fodder was in sight. The position, however, was relieved by beneficial rains of a general nature which greatly improved the outlook for the coming season.

An abundant supply of natural grasses and fodders at the beginning of winter prevented any serious reduction in the condition of stock during the cold weather. Preparations are well forward for the planting of fodder crops. In some districts large areas have been seeded and the favourable turn in the season assures a growth of green fodder and prospects of having a supply available for conservation are good. The output of dairy produce is on the increase in the North generally. The quality of the product shows an improvement which is attributable to more frequent factory deliveries due to increased output of cream, and to the generally cool conditions prevailing.

Dairy Factory Improvements.

REBUILDING and improvements to dairy factories were accelerated, and the completion of two large modern factories at Beaudesert and Toowoomba is approaching. In a number of districts the progress made in establishing the necessary improvements for modern dairy farm equipment has been satisfactory and in keeping with the general expansion of the industry.

There is a sound demand for dairy cattle of good type and quality. The improvement of dairy herds by the use of purebred dairy sires is receiving more attention than formerly.

Rural Schools and Home Project Clubs.

IN the course of a speech in the Legislative Assembly the Minister for Public Instruction (Hon. R. M. King) had this to say on rural educational activities:—

> Reference has been made to the splendid work carried out by the rural schools. In 1928 the enrolment was 3,281, and the average attendance 2,550. These figures do not include the senior children who come to rural schools from

neighbouring primary schools by road or rail for instruction in certain subjects. Fourteen schools were in operation in 1928, three more were opened in the first half of this year, and it is proposed to establish further schools at Proserpine, Pomona, Sarina, and Atherton. In this connection I would like to make some reference to the splendid work achieved by the Country Women's Association, which from time to time has raised funds as contributions towards the establishment of rural schools in certain localities. For that the association is to be highly commended. Our rural schools are doing excellent work. They are established in centres where they are likely to be of the most use, principally in agricultural districts where the scholars will probably undertake farm work when their school days are done. They are instructed in things which will make them more adaptable to the occupations they will follow, such as saddlery, sheet metal work, and carpentry, whilst, on the other hand, the girls are instructed in domestic science in subjects such as cooking, laundry work, and jam-making. This is very useful instruction indeed, and I think that it will help to make life on the land not only more congenial and happier, but also far more efficient and productive. I think the idea of the rural school is a splendid one, and I am very glad to see it in operation. I can assure the Committee that it will be encouraged to the best of my ability, because I think splendid results will accrue from it.

In connection with rural schools, I think it right to mention the home project clubs, which were mentioned by the hon. member for Fortitude Valley. These are partly educational, partly economic, and were introduced into schools to develop and foster the interest of the children of the rural districts in agricultural, stock, and farm matters. To show hon. members how the idea has caught on and is becoming more popular as time passes, let me quote the following figures:—

Year.	Number of Clubs.	Total Membership.	Number of Schools.
1927	74	546	53
1928	121	897	73

I cannot say what is going to happen this year, but I venture to predict that there will be a total membership of 1,000 in probably 100 schools.

It is very pleasing to note that the pupils of the home project clubs display an extraordinarily keen interest in their work. They are doing their work scientifically; they are doing it on second economic lines; and they seem to vie with one another in securing the very best results. In connection with these clubs, I desire to express my thanks to the different agricultural shows for the encouragement given to these clubs, and particularly to the Royal National Agricultural Association, Brisbane.

Cane and Vegetables.

SOME cane farmers on the Lower Burdekin are giving attention to vegetable-growing and other crops. On Rita Island and round about Jarvisfield, small areas are being cropped for tomatoes, cucumbers, and potatoes with good financial results. In fact some of the growers have already entered the export trade and one recent shipment included well over a thousand cases of tomatoes from those localities. The growers have formed a sub-branch of the Bowen Fruit Export Society. A very fine display at the last Ayr Show of tomatoes, cucumbers, and other vegetables was a striking testimony to the suitability of the district's soil for such products, and was a praiseworthy effort on the part of the growers to arouse the interest of farmers generally in the wisdom of engaging in other lines of agriculture as well as sugar-cane.

Bureau of Sugar Experiment Stations.

CANE PESTS AND DISEASES.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received from Mr. A. N. Burns, Assistant Entomologist at Mackay, the following report for the month ended 12th October, 1929:—

Occurrence of New Guinea or Weevil Borer (*Rhabdocnemis obscurus* Boisd.) at West Plane Creek, Sarina.

During the past month attention was drawn to the occurrence of this pest on two farms which adjoined each other, at West Plane Creek. An inspection of these farms was, therefore, carried out so as to ascertain the extent of the damage and find out if control measures were necessary.

The areas attacked lie on either side of a scrubby creek, bordered on their other sides with scrub-covered hills. Some of the latter had been cleared years ago and planted with cane, and now much volunteer cane is growing amongst the young second growth scrub. Some of these old canes had been introduced from the more northern areas, and it is very likely that the borer found its way to this particular locality with the introduction of these canes years ago. With these volunteer stools growing amongst the grass and scrub, they no doubt form an ideal breeding ground for the weevil borer, and it is obvious that infestation is maintained in this area through these canes.

The infested cane on both of the farms under question was Badila, and the degree of infestation was only moderate, and was confined chiefly to the basal portions of the sticks or to sticks which were lying down and covered with trash and rubbish. It was accordingly decided to make arrangements to have a consignment of Tachinid flies (*Ceromasia sphenophori* Vill.), which are a natural parasite of this borer, liberated in this area. These flies will breed in the cultivated canes as well as in the volunteer cane; this should greatly lessen the infestation in future seasons and act as a check on the spread of the borers.

In the cane areas north of Ingham, the beetle borer comes probably second in importance as a cane pest after the notorious greyback beetle grub, but very fortunately the Mackay district, taken as a whole, is, comparatively speaking, free from any serious outbreaks of this pest. It has been recorded from Silent Grove, Kungurri, Kolijo, Foulden, Rocklea, Finch Hatton, and West Plane Creek. In each instance the attacks appeared to be confined to Badila cane, and in the far north this appears to be its favoured variety. There is no doubt that further records of borer occurrence will be forthcoming from different parts of the district in the future.

In view of this, any growers who observe these borers in their canefields are requested to bring the same under the notice of the Sugar Experiment Station, Mackay, so that if necessary arrangements may be made to have Tachinid flies liberated on their farms, and thus prevent further spread of this pest. When flies are liberated it is necessary for the grower to leave a small block of the borer-infested cane as standover for the flies to breed in during the growing period of the other cane. Less than a quarter acre is sufficient to leave for this purpose, and care should be exercised to see that the "standover block" is not burnt whilst burning trash, &c.

Many growers may be troubled with large moth borers in their canefields, and may therefore not be sure if it is beetle borer or not that is attacking their cane. In order to assist them in correctly determining between these two borers the following brief descriptions of each one should be of assistance. It must here be pointed out that liberations of Tachinid flies are no use at all for controlling moth borers:—

Large Moth Borer (*Phragmatiphila truncata* Walk.).

The larva or caterpillar of this insect attacks either the mature cane sticks or the young shoots; in the former case it is soft varieties such as H.Q. 426 or B. 208 that are usually attacked, and the injury almost always occurs fairly high up in the stick and often in the vicinity of a node. The moth borer caterpillar when fully grown measures approximately from 1⅛ to 1¼ inches in length; it is of a light pinkish or purplish brown colour, with a brownish yellow head. These caterpillars when removed from their tunnels move fairly rapidly with the usual undulating caterpillar movement. The change into the chrysalis which is dark brown and about ⅝ inch long, may take place in one of the old tunnels, beneath loso leaves or trash, or just below the surface of the soil. When the attack occurs in mature sticks pupation then usually takes place under clinging trash, &c., but when the injury occurs amongst young shoots, the caterpillars enter the soil to pupate. From these pupæ, greyish brown moths with a wing expanse of about 1 inch emerge. Though plentiful enough, these moths are not often noticed on the wing. Some species of stout grasses, also corn and sorghum, are recorded as being also attacked by caterpillars of this insect.

Weevil Borer (*Rhabdocnemis obscurus* Boisd.).

The adult beetle borer measures a little over half an inch in length, and is of a dark brown or ochreous colour with a large central black marking on the thorax, and two rounded black patches on the back of the elytra or wing covers. The sides of the body as well as the legs are blackish. The head is produced into a curved snout or proboscis about ⅛ inch in length. This curved rostrum is a typical character in weevil borers.

The female borer makes a small tubular tunnel with its proboscis through the rind of the cane into the internal tissue and deposits an egg therein. The incubation period varies according to the season of the year, from a few days to a couple of weeks or so, and on emergence the young borer grub immediately commences tunnelling and feeding.

The fully-grown borer grub measures about, or a little over, half an inch in length in the natural semi-curved position; it is creamy white in colour with a brown head. It has no legs, and the body is stout and thickest near the anal extremity, to which the body then rapidly tapers. These grubs frequently move for long distances through the cane sticks, and their tunnels are invariably filled with shreds of fibre and grass. Before pupation these grubs assume a decidedly creamy yellow colour, and their bodies become slightly more elongate, they then form a cocoon of fibres and grass interwoven in one of the tunnels, and usually just below the rind of the stick. These cocoons measure approximately 1¼ to 1½ inches in length and about ⅜ inches in width. The time spent in the grub or larval stage varies from about five to six weeks to three months or so, being dependent upon the season of the year.

The pupa or chrysalis is enclosed within the fibrous cocoon, the pupa is almost inactive, being able to move its abdomen only slightly. It resembles in shape the adult beetle, with its legs neatly folded in front, and the wing covers are contained in two elongate bud-like processes. The newly turned chrysalis is creamy yellow in colour, it becomes darker as development progresses, until finally just before emergence, it is almost black. The time occupied in this stage is shorter during warm weather than in cold, but the average period may be estimated at about three weeks. The newly hatched beetle is soft, so it remains within the cocoon for a few days to harden up before commencing to bore out of the cane stick.

The New Guinea borer, as its name implies, was introduced from New Guinea, and as before stated, has now become a serious enemy of sugar-cane in northern Queensland. No artificial means of control have yet been devised, and as the damage occurs within the cane sticks themselves, a considerable amount of difficulty presents itself. The Tachinid fly (*Ceromasia sphenophori* Vill.) which is one of the borer's natural insect parasites (Dipterous) in New Guinea, has been successfully introduced into Queensland, and is bred at the Meringa Experiment Station, near Cairns, from which place liberations are made from time to time in borer-infested cane-fields. Already these useful flies are well established in the South Johnstone, Babinda, and Cairns districts.

The female fly deposits her eggs in the grass, &c., at the entrance to one of the borer tunnels, and the young larvae or maggots on locating a borer grub, enter its body and feed on its internal tissues, ultimately resulting in the death of the borer. Sometimes the parasitised borer is able to form a cocoon, but before it is able to pupate the fly maggots have destroyed it, and they then leave their host's body and pupate themselves. Their pupae are about 3/16 of an inch in length, and dark brown in colour, and cylindrical with round ends. They are called puparia. As many as five or six maggots may breed up inside one borer grub, so it can be seen that these flies breed fairly prolifically. The complete life cycle of the Tachinid fly occupies about six weeks.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following report (18th October, 1929) from the Southern Assistant Entomologist, Mr. R. W. Mungomery:—

FALSE WIREWORM ATTACKING CANE SETS.

Amongst the several insects that attack cane sets when planted in early spring, and which, therefore, contribute towards an inferior strike, may be mentioned the false wireworm, which has been noticed on some farms this year.

The insect in question is about ¾ inch in length, thin and cylindrical, and it is of a shining creamy-white to light-brown colour and bears a superficial resemblance to a small millipede or "thousand-legs," although, of course, this insect has only six legs and would never be confused with the latter on that account. It can be readily distinguished from the true wireworm by the absence of the hard reddish-brown head and tail plate, and also by the fact that its jaws are directed downwards, whereas the jaws of the true wireworm project out in front of the head like a pair of callipers. This insect has the peculiar habit of "playing possum" or shamming death when touched. At first it gives a sudden wriggle and then remains quite motionless on the ground, and, if left alone, it will be seen burrowing back into the soil in a few minutes. It is most frequently met with in wet localities that have carried a fair crop of native grasses previous to being ploughed and planted with cane, and it usually occurs near the surface of the ground where the dry surface soil meets the moister soil underneath. It is thought that, in addition to eating into the cane sets, this insect lives on decomposing vegetable matter which is intermixed with the soil.

The beetles that are responsible for these so-called false wireworms are about three-eighths of an inch in length, and of a blackish colour. Soon after their change to the beetle stage from the pupa, their wing cases become covered with the soil in which they have been living, so that they appear reddish-brown in red soils, greyish in the lighter forest soils, and a dirty black in the black clayey soils. The beetles can sometimes be seen scurrying across the ground in the daytime, and in wet weather they forsake the ground and climb trees or fence posts where they congregate in large numbers, particularly under loose bark or in any irregularities of the fence posts which afford them protection.

The wireworms are present in the soil during the winter, and as soon as spring comes, they commence to eat into the young swelling buds of the cane sets, their injury giving one the impression that a hot piece of wire had been pushed into the eye, and from the damage they inflict the eye fails to shoot.

Although generally they may cause some annoyance in wet localities by eating out a set here and there, only in odd cases do they cause extensive damage and make a re-plant necessary. When this happens it is a good plan to defer planting until October, when they are practically all full fed and on the point of changing to the pupal stage.

As a control measure, scuffling during the months of October and November is to be advised, since they pupate near the surface and the scuffler tynes account for several as this implement is being dragged along the cane rows. In addition, burning clumps of dead grass under which the beetles congregate will do much to lessen their numbers.

A MAGAZINE FOR THE FAMILY.

A Moggill farmer, in renewing his subscription for two years, writes (12th October, 1929) appreciatively of the Journal and adds: "It is not only myself who looks forward to the Journal, but my children also. Dad often has to play second fiddle in reading the contents, and when I do get hold of it I have to explain this and that, which shows clearly how even the kiddies take an interest in the Journal."

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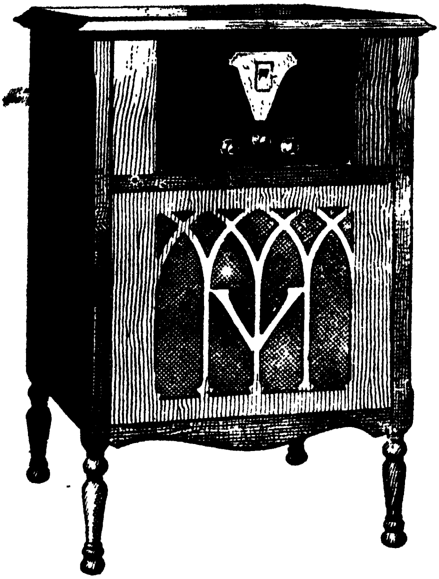

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SCLEROTIUM CROWN ROTS.*

By J. H. SIMMONDS, M.Sc., Plant Pathologist.

The fungus *Sclerotium rolfsii* is a soil-inhabiting plant parasite found widely distributed throughout the world. It shows very little discrimination as regards its selection of a host, and, so long as the conditions are such that abundance of warmth and moisture are provided for, it would appear capable of attacking a wide range of herbaceous plants. A few of the cultivated plants recorded in other countries as being attacked by the parasite are tomato, potato, tobacco, rhubarb, cotton, peanut, maize, citrus, strawberry, bean, carnation, violet, chrysanthemum. Acting as a storage rot, it may attack cucurbits, cabbage, and Irish and sweet potatoes. In Queensland *S. rolfsii* has appeared chiefly in commercial and private flower gardens, attacking delphiniums, carnations, and gerberas. It has also caused loss in some economic plants, including the strawberry, orange, and persimmon.

SYMPTOMS.

The fungus usually attacks its host at the crown just below ground-level. The outer tissues are invaded and a rot set up which may encircle the stem and spread down along the roots. The presence of disease then becomes manifested in a wilting of the upper portion of the plant. If the weather conditions are moist, the mycelial threads of the fungus will grow out together in a longitudinal direction to form white radiating fans which extend up the stem and outwards over the surface of the soil. Often there is associated with the white threads a number of small rounded brown bodies known as sclerotia (Plate 170).

In the case of the strawberry, the white mould growth can be seen amongst the bracts and leaf débris of the crown, and from here the radiating fungal threads extend out along the base of the leaf and fruit stalks, which soon assume a brown rotten condition, with the result that the leaves and fruit wilt off and die.

The orange and persimmon are affected in the seed-bed. At one or several points in the bed the seedlings commence to wilt off, and the trouble continues to spread in an ever-widening circle. On pulling up a wilted plant, the stem is seen to exhibit just below ground-level a dark shrunken area of decay associated with which is the fungus.

THE CAUSAL ORGANISM.

Sclerotium rolfsii is one of the few fungi which have never been known to develop a definite reproductive stage. For this reason it is included for convenience with several similar types in the group Mycelia-Sterilia.

The fungus is distributed by means of mycelial threads and sclerotia which are carried about in association with the remains of the host plant or in infested soil. The sclerotia are structures specially adapted to resist desiccation and other adverse conditions of their environment, and so serve to a certain extent the purpose of the spore of other fungi in the perpetuation of the disease.

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*Reprinted from "Pests and Diseases of Queensland Fruits and Vegetables" by Robert Veitch, B.Sc., F.E.S., and J. H. Simmonds, M.Sc., published by the Department of Agriculture and Stock, Brisbane, 1929.

PLATE 170.—GERBERA ATTACKED BY *Sclerotium rolfsii.*

In the formation of these sclerotia the fungal threads become aggregated at certain points, and branch and rebranch to give many short segments or hyphæ, which become interwoven to form a loose white cottony ball of somewhat less than $\frac{1}{16}$ inch in diameter. By further branching, interweaving, and fusion of the hyphæ a firmer structure is produced. This becomes differentiated into an outer firm, resistant layer or cortex in which the individual threads have become so fused together as to form a cellular structure somewhat resembling the parenchymatous tissue of higher plants. The interior or medulla consists of thinner walled hyphæ arranged in a somewhat looser manner. As the sclerotium matures its colour changes from white to light or dark brown, and finally takes the form of a firm rounded body of about $\frac{1}{16}$ inch or less in diameter, somewhat resembling in appearance a small round radish-seed.

CONTROL.

The soil-frequenting habits of this fungus make its effective control a somewhat difficult problem.

1. Pull out and burn any diseased plants.

2. Do whatever may be possible, by means of thinning out and pruning, to allow access of sun and air to the plants, as it is moist conditions that are specially conducive to the growth of this fungus. Good drainage and wide spacing of the plants will help in this direction.

3. To eliminate the fungus from the soil after it has become infected is a difficult matter. Taubenhaus in America has shown that the mycelium and sclerotia are apparently killed when buried more than 5 inches deep, and hence deep ploughing or digging-in of affected soil may be beneficial. Drenching the ground with lime sulphur solution may be useful in checking the disease in the seed-bed, while the same mixture sprayed well into the crown of strawberry plants may prove of use when this plant is attacked.

WHEN MAKING BORDEAUX MIXTURE.

If Bordeaux mixture is to give satisfactory results in the control of the many fungus diseases of fruit trees and vegetable crops for which it is used, it is important not only that it should be properly prepared, but that the ingredients be pure.

Samples of bluestone sometimes come on to the market which contain a quantity of sulphate of iron, and it is as well that the grower should know the difference. Bluestone proper should be in the form of dark-blue crystals, while the adulterated mixture is a lighter blue; indeed, the characteristic colour of sulphate of iron is a light green. The bluestone may be tested by dissolving a few crystals in water and adding a little ammonia. A pale blue precipitate is formed which dissolves to an intense blue colour, and the solution remains perfectly clear and free from sediment if allowed to stand for a while. If a reddish sediment settles, it is due to the presence of iron.

It is important that the lime used should be freshly burnt. To test whether it is so, a few lumps should be placed in a heap and sprinkled with water, when it will gradually fall to pieces, becoming very hot in the process, giving off a quantity of steam, and crumbling to a fine, white powder. Some lime may not crumble readily with cold water, but may do so with hot water. If it does not get hot enough to give off steam even with hot water, then the lime is unsuitable.

THE BANANA INDUSTRY.

NEW MEASURE FOR ITS PROTECTION.

Better provision for the protection of the Banana Industry is the object of a measure introduced in the Legislative Assembly last month by the Minister of Agriculture and Stock (Hon. Harry F. Walker). Under it greater command of their industry is given to growers, while certain responsibilities are imposed upon its representatives. Subjoined is Mr. Walker's second-reading speech, somewhat abridged, on the Bill, and which is taken from ''Hansard.''—ED.

SPEECH BY THE MINISTER.

THE SECRETARY FOR AGRICULTURE (Hon. H. F. Walker, *Cooroora*): It gives me pleasure to move the second reading of this Banana Industry Protection Bill, because it is really the first Bill I have had the pleasure of moving in connection with an industry which particularly affects the growers in my own district.

Historical Sketch.

In reading up the subject, I went back a few years to try to find out when bananas were first grown in Queensland, so as to get some idea as to their growth since. I came on a cutting from a newspaper which was written by a gentleman, whose name I will give directly, giving some idea of what the industry was forty-six years ago. He wrote thus—

> ''The extent to which the banana is cultivated, and the number of human beings who are more or less dependent upon it for food in warm countries, is wonderful, equalling and perhaps exceeding that of any other known plant. It is one of the most useful plants in the world, and seems to have migrated with man wherever it would grow. It is for an immense portion of mankind what wheat and other cereals are for the inhabitants of Europe and Western Asia. It is one of the greatest blessings bestowed on mankind in hot climates.''

That was written forty-six years ago by the late L. A. Bernays, the at-one-time clerk of this House, and father of our present respected clerk, in his work ''Cultural Industries for Queensland,'' in which he gives some idea of the extent to which he had gone into the problem of the cultivation of a plant which has been growing successfully in Queensland ever since. Hon. members will see that it was grown in a great number of countries in the world prior to its introduction to any commercial extent into Queensland. At one time it was principally grown in the West Indies, the Canary Islands, Fiji, and other islands contiguous to Australia. We all know that only a few years ago most of the bananas consumed in Australia came from Fiji and other islands not far distant from our coasts, where it was grown under tropical conditions. In 1860, so far as the records show, no land was under bananas in Queensland. The growth of the industry since then is reflected in the following figures:—

Year.	Acres.	Production.	Value.
		Dozens.	£
1870	339	..	..
1880	410	706,560	..
1890	3,890	22,002,092	..
		Bunches.	
1900	6,215	2,231,108	..
1910	5,198	1,121,075	154,148
1920	8,981	1,198,121	349,452
1928	19,750	3,265,161	960,000

Hon. members will see from that table how the industry has grown, and the figures are more particularly interesting at the present moment on account of the efforts which have recently been made for the introduction of Fiji bananas to a greater extent than at present. It will be noted that the yield is in terms of dozens from the commencement of the records until 1899, whilst from 1900 to 1928 the return is expressed in bunches. It is only in later years that the annual value is given, and that fact alone gives hon. members some idea of the altered conditions in the industry, apart altogether from indicating its value to-day. Although the banana is a tropical plant, it has been largely grown on the southern coastal areas of Queensland from the Tweed River north. Its value has been recognised by all who take an interest in agricultural industries, including members who occupy seats on this side of the House, who appreciate its value on account of the cheap methods of cultivation which are suitable in the industry, the cheap way in which land can be broken up in comparison with other forms of farm life, and the fact that extensive and expensive machinery is unnecessary. It is well known to all hon. members that the industry has been pretty well established on the coastal areas of Queensland, where the mountainous country is particularly suitable for banana-growing. It has, however, suffered from disease. First of all, there was the weevil-borer. Later on "bunchy top" attacked the industry, appearing first on the New South Wales side of the border near the Richmond River. It rapidly spread to Queensland, and it was only men with some capital who were then able to engage in it successfully.

The Value of the Industry in Land Settlement.

To-day we see them successfully growing bananas, particularly under adverse conditions, with this dreaded menace rapidly overtaking them. One is really struck with these beautiful settlements, particularly in Queensland. New South Wales has had a painful experience with this dreaded disease, which almost wiped out the industry there, but it is pleasing to note that recently there has been a revival in that area. When one witnesses the settlement right along the north coast of Queensland as far north as Cairns, but particularly in the Gympie and Caboolture districts, up the Mary Valley, the Brisbane Valley, the South Coast, and along the tributaries of our principal rivers, one can realise what an advantage the industry has been to the Government, because the industry not only absorbed an enormous number of men who were in search of work, but it enabled men with small capital—men with no capital and many of our returned soldiers—to establish homes on small banana orchards. Roughly, an area of 5 acres is sufficient not only to provide employment, but in many cases to give a sufficient return to the grower. One can quite realise what a splendid adjunct this industry is from the point of view of land settlement, and from the point of view of absorbing labour. The small amount of capital required was a great advantage to the Government in that the Agricultural Bank could make the necessary funds available, and the settlers could immediately launch out in this industry, rquiring only a good strong arm, and probably a decent wife to help him. Banana culture does not demand the very best land. It is necessary only to have land suitable for the growth of the plant, so long as the soil contains suitable constituents. When I say it does not require the best land, I mean that it is not necessary to have the low rich alluvial flats required for other agricultural pursuits. All that is necessary is land situated on mountain sides, sufficiently high to be above the frost line, but not so high as to be subject to the cold winds prevalent in all countries. Bananas can be grown on the steepest and rockiest land. One marvels at the ingenious methods adopted by orchardists on the North Coast line, and to witness the clever means of conveying the fruit from one mountain side to another by aerial lines. The fruit is also conveyed by means of tramways and in other ways. Nearly all the fruit gravitates in one direction, which leads to a wonderful reduction in the labour required to work the holding. The fact that bananas can be grown on mountain sides presents the natural corollary that the land can be secured at a cheap rate, which is of great assistance to the beginner. It is a regular eye-opener to any person travelling on the North Coast line to see the place studded with banana plantations; and one is filled with pride at the sight of those Queenslanders, who have gone out with the object of supplying Australia with an absolutely necessary article of diet, particularly from the point of view of health. The Bill has been introduced to encourage that good work, and with a view to increasing production, having in view the absorption of unemployed labour which to-day is to be found in idleness in our streets. All that is required is a small amount of capital, and that can be secured from the Agricultural Bank. I strongly urge members of Parliament and members of agricultural organisations and co-operative bodies to do what I urged the miners of Gympie to do when I first became a member of Parliament. I urged upon them to get out into the country; but, comparatively few followed that advice. If they had done that, they would have been far better off growing bananas or dairying in the Gympie district than roaming all over Queensland and Australia searching for work. I tender that same advice to-day. It is our bounden duty to demonstrate the possibilities of this industry to the man who is looking for a home. It is not necessary to have an expensive house. There are some hon. members in this Chamber who have taken up the attitude in connection with the Department of Public Lands that the enormous areas embracing State forests and timber reserves, particularly on the Brisbane River, the Mary River, and in our coastal districts—land that cannot be alienated except by Act of Parliament—should be made available for closer settlement.

Banana-Growing and Forestry.

We can, with advantage to the grower and the State as well, advocate the growing of bananas in conjunction with the growth of pine trees. Here we have a system which helps the man with a little capital to go upon the land and make a good living. I do not think that pine trees can be grown in any other way under existing conditions in Queensland except in the form I have indicated; but I am afraid that the Speaker will not allow me to enlarge upon that system. Anybody who knows anything about banana-growing knows that it is an industry in which a man can easily become established. As soon as the man falls the scrub and burns the fall off in three or four months, he digs his holes and plants his banana-suckers. The banana plantation is then all ready for him. Fourteen months afterwards the trees will have sufficiently developed to enable him to commence to make money from them. The time has come when we should point out the advantages of banana-growing, knowing full well that we are now only supplying half the Australian requirements. We should launch out in the direction I have indicated with a view not only to supplying this market, but with a view to relieving the congestion on the labour market. It would be one of the most effective methods of dealing with unemployment that I know of, and more particularly in view of the advantages that the markets offer to the people of this State to develop the industry.

The Call of Country Life.

I need not dilate any further on that side of the question; but I would like to emphasise the small amount of capital that is required to engage in banana culture. Beyond preparing the ground for the planting of suckers the banana-grower has only to purchase cases. No machinery is required, and there is a ready market for his products in the Southern States. Although the market fluctuates, nevertheless the prices compare very well with the prices obtainable for other primary products, while the remuneration the grower gets for his labour compares favourably with that of his neighbours engaged in other forms of primary production. The main thing is that the banana-grower is a contented man. I have no hesitation in saying that, when a man has lived in the bush and knows the privileges of bush life as I do, there is no occupation which can be compared with it for comfort and the pleasure derived. As I pointed out a while ago, a rough estimate of the value of the banana industry to Queensland is £1,000,000 per annum. It may be more, because no record can be kept of the fruit that is eaten in Queensland. That gives hon. members an idea of the importance of the industry. There is still more wealth to be produced from it. I would emphasise the fact that, since strict grading was enforced about twelve months ago, the benefit accruing to the fruit placed in the Southern markets has been enormous. Unless we are prepared to be up and doing and to take advantage of the opportunities now offering, we shall probably lose a trade which we can ill afford to lose. We shall have outside competition to meet, for, despite the high tariff, bananas are being imported from centres outside Australia, where, because of the cheap-labour conditions, they can be produced for a few pence per bunch. We want to go right ahead with the banana industry, because it is of vast importance to the State, and this Bill has been brought down with that end in view.

Extension of the Industry.

I have spoken about the waste lands in this State; and I wish to emphasise that we can extend this industry further North. By waste lands I mean lands that are unsuitable for dairying and agricultural pursuits. It was one of my pleasures last year, when travelling through the North, to see that vast valley of beautiful land in the Tully district. It was truly remarkable to see that land, and I make bold to say that, so far as banana land is concerned, we shall not exhaust our resources in that direction for many years to come. Knowing that fact, there is nothing to stop the industry from going right ahead. What is wanted to-day is a step forward in order to catch the market we have down South, and in this manner obviate any attempt on the part of agitators to import bananas from outside Australia, which are grown under inferior conditions to those under which the industry is carried on in Queensland. . . .

The duty of 1s. 6d. per cental introduced in 1911 had some beneficial influence. The increased tariff of 1920 to 2s. 6d. per cental, and in 1921 to 8s. 4d. per cental, which placed the industry on a level with the protection given to other green fruits, was the means of stabilising the industry and placing it on a reasonably satisfactory footing.

Proposed Board of Advice.

The first real difficulty met with by banana-growers in Queensland was the occurrence of the borer-weevil. I do not want to enter into a dissertation on the borer-weevil and ''bunchy top,'' any more than I have already done in connection with the last Bill. The reason I mention them is to connect these particular menaces up with the board proposed to be appointed under this Bill. As a matter of fact, although the Bill is not law, we are practically working along the lines laid down here, rather than lose the season. In order that control measures might be started on right lines, the Government in 1920 appointed Mr. Froggatt, an entomologist, to investigate thoroughly the borer-weevil, and for the last eight or nine years his time has been exclusively spent on this pest. The department certainly did its best, with no apparent result to the present time. Going further, we must remember that ''bunchy top'' has played a big part in the destruction of our orchards. It is a crying shame to see the beautiful orchards that at times have been destroyed by this disease. We have to give assistance in the form referred to by the Bill, in order that the ravages of this pest may be restricted.

Probably hon. members know the seriousness of the leaf-spot pest in bananas; but they will realise it more when I tell them that it is 50 per cent. worse than the ''bunchy top'' disease.

The object of the present Bill is to create an organisation which will be specially charged with the business of improving and developing the most important section of the fruit industry of Queensland. The board will consist of four members, two of whom are to be appointed by the Minister and two by the growers. The Governor in Council will appoint the chairman, who will be a Government representative. The duties of the board will be to advise the Minister on banana problems, including the policy of the banana experiment stations; advising the Minister on scientific problems, such as ''bunchy top,'' leaf-spot, and other diseases; aiding in the dissemination of information regarding bananas; and such other duties as may be entrusted to it. I have always found it advisable to take the public into my confidence. I have done so in the butter factory with which I am associated, because I find that it makes for the best results.

The board will administer the Diseases in Plants Act so far as bananas are concerned, and in that respect it will deal with abandoned or neglected plantations, with banana quarantine matters, with the issue of permits, with plant bananas, and with trafficking in banana suckers. In connection with the issue of permits, we have had a considerable amount of trouble in getting information expeditiously. That matter, however, has been tightened up to a great extent by the Under Secretary and other departmental officers. The main point is that we want to have a check on the work of the inspectors, and in this connection the board which is now functioning will do good work.

Banana Experiment Stations.

There is also the policy regarding experiment stations. The board will make investigation, and then make certain recommendations to the Minister. The Minister has full power as to whether he will accept recommendations or not. It is for the experts to consider those recommendations, and the Minister will be advised by them. . . . . The duties of the board will also include the visiting of banana-growing districts from time to time. If any trouble arises, say, in the South Coast district, we shall send the members of the board there immediately. As a matter of fact, members of the board went out to Samford yesterday, where they did effective work. They reported three or four banana plantations as being infected. We are endeavouring to find the owners, and if we cannot do so we shall have to clean them up ourselves. The board will also aid in the distribution of information regarding bananas.

This brings me to the question raised by the hon. member for Barcoo (Mr. Bulcock), who said that we should get in touch with those who have gardens in which they grow a few banana trees, with a view to giving them information. That is a very excellent suggestion, and one that will be followed. The board will also furnish reports on matters submitted by the Minister, and perform such duties as may be required.

Administration.

Loading bananas to-day at the railway stations is rather expensive when you consider the work done by the loaders. They work half a day, say, twice a week, or at most two days a week, and for the remainder of the time there is nothing for them to do. We propose to appoint them as inspectors and also to do other work, and that will minimise the cost of loading, which is fairly heavy at the present time. The board will also administer the Diseases in Plants Act, which deals with abandoned and neglected banana orchards, quarantine, the issue of permits to plant, and trafficking in the sale of suckers. That is the most important duty, and one which the department should control. At the present time suckers may be sent anywhere without any supervision. After they leave the orchard it is hard to locate them. Only to-day the Under Secretary reported to me a case where a truck of banana suckers was sent from the North, only to find when they reached Southern Queensland that there was something wrong. That shows conclusively that men will traffic in these banana suckers, and it is hard to control them. The inspector in each district will keep in touch with the movements on all farms in his district. He will also advise the Minister in regard to abandoned or neglected banana orchards, and he should know whether an orchardist is keeping his farm clean or not.

The Inspectors' Board has sweeping powers, but I will not deal further with that subject, because I referred fully to it in connection with the Diseases in Plants Bill. Our object is to try to get these men to do dual work. The work is of an interesting character, which the inspectors should readily take up. In my opinion, our inspectors, no matter whether they belong to the Department of Agriculture or to the Department of Public Lands, should have a knowledge of the activities of the various State departments.

The Governor in Council may endow the fund to the extent of £1 for £1. A similar arrangement is now being carried out, and is working effectively. The question of a levy will arise later on; but the amount will be subject to the recommendation of the banana-growers. It is proposed to follow on the lines of a similar system which has been in vogue before.

Compensation.

The question of compensation is also dealt with under this Bill. I do not agree with what the hon. member for Barcoo said regarding quarantine areas; but he was on sound ground when he spoke of the compensation to growers, if we destroy not only unhealthy plants but also healthy plants. That is the policy of the department to-day. Any loss in respect to diseased plants must be borne by the individual concerned; otherwise there would be no incentive to his cleaning up his home.

A White Man's Industry.

In Queensland, banana-growing is a white man's industry. At the present time the industry supports approximately 16,000 white Australians—I include men who are growing bananas, and their wives and families and others indirectly concerned with the work. It is one of our principal industries to-day. It also provides work in connection with boxes, and for carters, railway workers, and distributors. One has only to watch the fruit trains going from Brisbane and loading at the various stations, to see the vast amount of work provided in that way. These fruit trains have been in operation for some years, and the industry could not possibly do without them. Bananas are carried to New South Wales and Victoria very quickly, taking into consideration the transhipments involved.

This Bill is purely complementary to the Bill which has just passed its second reading, and I have now much pleasure in moving—

"That the Bill be now read a second time."

THE JOURNAL AT SCHOOL.

A country school teacher writes (10th October, 1929):—"I wish to renew my subscription for the Journal. . . . It has proved very interesting, and has assisted me largely in my nature study work."

THE WHEAT INDUSTRY IN QUEENSLAND.

A COMPREHENSIVE REVIEW.

> **Since assuming office I have been engaged in examination of the principal primary industries with a view to ascertaining the directions in which development is practicable. I am convinced that the greatest relief of the depression from which the country is suffering will lie in the fuller utilisation of our natural resources. A dissemination throughout the community of increased wealth taken from the soil would stimulate trade and increase the avenues of employment.**—*Hon. Harry F. Walker, Minister of Agriculture and Stock.*

THE present position and condition of the wheat industry in Queensland were reviewed by the Minister of Agriculture and Stock (Hon. Harry F. Walker) in the course of a recent statement to the Press, of which the following is the full text:—

Queensland's Bread Needs.

Upon investigating the position of the wheat industry I find that the consumption of wheat in Queensland in the matter of the bread requirements of the people may be taken at approximately 5,000,000 bushels, exclusive of requirements for seed, poultry feed, and such like. Over a period of eleven years we have produced on the average barely half of these requirements. A doubling of the wheat production of the State would mean an increase in the income of the State of close upon £750,000 per annum.

Dependence upon Southern States.

Some weeks ago alarming reports were received respecting the prospects of the wheat crop in New South Wales. Some reports went so far as to forecast that there was little likelihood of there being any surplus from New South Wales for export next season. Happily, rains in some districts have to some extent improved the outlook in that State. The situation during the dry period, however, served to focus attention upon the position in which Queensland would be placed in the event of a New South Wales wheat failure. If we do not have enough wheat for our own needs we would be dependent upon Victoria and South Australia for wheat for local consumption. From the standpoint of importation of flour, it is possible that Southern manufacturers might then take advantage of the situation by combining to treat Queensland as an artificial market and demanding artificial prices.

In any event the experience of history dictates that a State should produce its own bread supply. The fact that we have not been doing so in Queensland has impelled the Government to look into the position in an endeavour to correct this very unsatisfactory state of affairs. Probably Queensland will never be a great wheat-producing State as are some of the Southern States. But it is believed that existing wheat lands on the Downs and in the Maranoa, already served by railways, roads, &c., are capable of producing sufficient wheat for the needs of the State if reasonable encouragement were offered wheatgrowers.

The Objective.

I have therefore adopted the objective of assuring the production by Queensland growers and the milling by Queensland mills of this State's bread needs. **Realising that such an objective cannot be achieved without the co-operation of those concerned in the primary and secondary industries, I convened a conference between the Wheat Board, as representing the growers, together with the millers, representing the secondary industry, in the hope of finding it possible to take definite steps in the direction of achieving the objective.** The conference sat at intervals throughout the month of September. Frequent adjournments were necessary.

Past Misunderstandings.

It appears that over a considerable period of years misunderstandings have existed as between the Wheat Board and the millers. It was not my purpose or desire in asking the respective interests to meet me to investigate all the details and causes of any such misunderstandings which have existed in the past. Rather the object was to see what could be done to create goodwill in the future, as in the absence of that goodwill I felt that the object of encouraging wheatgrowers to increase wheat production would be difficult of achievement.

It also appears that the lack of harmony which has obtained in the past as between the Wheat Board and the millers has resulted in—

(1) The Wheat Board having to retain considerable stocks of wheat of one season well into the next year.

(2) First payments by the Wheat Board to the growers being less than they might otherwise have been and final payments being considerably delayed pending realisation.

(3) Costs being sustained by growers through accumulating charges by double handling of wheat at country stations.

(4) Sustaining by the growers of additional interest and storage charges.

(5) Loss attendant upon the deterioration of the quality of the wheat.

(6) On occasion wheat being exported by the Wheat Board while Southern States wheat has been brought in by the millers.

(7) The market formerly enjoyed by the Queensland millers for Queensland flour being invaded by Southern millers.

Probably not all of these results have accrued in any one season, but some have operated every season.

Importance of Markets.

In any event before considering the advocacy of the increase of wheat production in Queensland, it was felt expedient to confer with the interests concerned in the marketing of the product so as to verify the opinions held to the effect that a satisfactory local market exists for increased quantities. In the embarking upon projects for increased production there has, in the past, been an inadequate regard for the markets available. It was desired in this instance to assure the market.

Consideration by Conference.

The conference between the Wheat Board and the millers duly assembled under my presidency on the 4th and 5th instant. It was considered—

Firstly—Whether it would be sound and practical to aim at the objective of a doubling of the wheat production; and

Secondly—Whether it was not possible to bring about a mutual understanding as between the Wheat Board and the millers.

As regards the first-mentioned consideration—namely, that of the practicability of increasing the State's wheat production—I am pleased to say that all interests concerned, both including the Wheat Board and the millers, as well as the technical officers of the Department appear to be united in the opinion that the objective is reasonably practicable and attainable.

GENERAL PRINCIPLES.

With a view to facilitating discussion I submitted to conference an outline of certain general principles. For instance, I pointed out that, in the past, wheat has been received by the State Wheat Board and put into sheds or dumps at country stations and has later been taken out when required by mills, as a consequence of which double handling costs were involved, and sometimes also avoidable damage. It was further suggested that an organised transport arrangement be carried into effect involving the nominating of a special transport officer by the Commissioner for Railways during the wheat receiving season to co-operate to the fullest extent with the Wheat Board in marshalling and fully utilising rolling-stock with a view to reducing country storage and if possible to eliminate "dumping" and damage therefrom. It was also suggested that millers should undertake to store wheat at mills on behalf of the Board to the fullest extent, the millers to be responsible for the agreed intake weight of wheat, and all wheat as received at mills to be checked by a representative of the Board. As regards price, a suggestion was made that an understanding should be arrived at providing for a minimum grist by each mill at a price to be fixed according to a formula based upon an agreed upon margin of so much per bushel above New South Wales country station values. I suggested that settlement might take place on the Wednesday of a given week in respect of the gristing up to Saturday of the preceding week, and that millers' gristing accounts would be subject to audit by the Auditor-General. It was intimated by me that, in the event of an understanding being reached between the parties to operate for a term of years with a view to affording the necessary assurance and encouragement to the growers, the Government would assist in the making of arrangements for a more attractive first advance to growers than has hitherto been the case, as well as to facilitate a quicker final distribution, the intention being to wind up one season's crop before a new season's crop comes in.

It was pointed out that the advantages which would accrue under such an arrangement if carried into effect seemed to be—

(*a*) That stabilisation as a result of a working arrangement between the Wheat Board and the millers would be an encouragement to growers on the Darling Downs to go in more largely for wheat.

(*b*) Wheatgrowers would be assured of full parity values for their product.

(*c*) The stabilisation attaching to the arrangement for a term of years would encourage millers to improve their plants, to provide more storage, &c., and generally to increase efficiency and reduce costs.

(*d*) The Wheat Board would be encouraged to reduce costs by saving of storage, handling, &c.

(*e*) The very heavy losses sustained through prolonged storage of wheat at country stations would be very largely obviated if not eliminated.

(*f*) Continuity of policy would be assured which would react favourably upon the growers.

(*g*) Millers would have adequate supplies of wheat at command of a better quality than that which was available generally in the South, and the continuous working which would be possible would tend to reduce millers' overhead expenses.

(*h*) Generally the increase of wealth through augmented wheat production and by increased consumption of Queensland-made flour would assist in relieving unemployment and add to the general prosperity.

The foregoing is a summary of the general circumstances which seemed to justify close consideration by the Government of the questions involved, and the determination to solve them, and the evolving of ideas to that end.

AGREEMENT REACHED.

I am pleased to be able to announce that a complete agreement has been reached between the parties covering a period of three years commencing with the coming season's crop. It was my concern throughout that any understanding should be fair to the grower in ensuring him of the full reward of his labours, just to the consumer, and not harsh upon the secondary industry. The price of bread in Queensland has for some time compared favourably with that ruling in the other States. I was anxious to make sure that this should not be departed from, and am pleased to say that the parity of bread prices will not be affected. So far as concerns the grower, it is generally known that Queensland has a natural geographical advantage. This has been secured for the producer.

The following are the main points in the arrangement, namely:—

1. Queensland millers undertake to endeavour to increase the consumption within the State of flour made from Queensland wheat up to 4,000,000 bushels within the three-year period.

2. Pending the millers building up the trade referred to and for the first year, millers agree to purchase a total of 3,500,000 bushels of wheat (subject to the wheat being available) for gristing purposes. In addition to this there is a substantial trade for poultry feed, seed, and other purposes which should enable the absorption of a 4,000,000-bushel crop immediately, should we be fortunate enough to secure such a harvest from the crop now in the ground, while as a result of the co-operation of the Wheat Board and the millers it is hoped during the period of the agreement to approach the 5,000,000-bushel local market objective.

3. Feed wheat will be the subject of a separate arrangement.

4. To maintain to the growers the existing geographical advantage, millers agree to purchase wheat under a formula calculated to assure a gross realisation at Queensland country stations of approximately 8d. per bushel above New South Wales country station parity, or 1d. per bushel above Wallangarra or Sydney.

5. With a view to economising in the cost of operations, the Wheat Board has entered into an arrangement with the millers to act as acquiring agents at country stations or mills, as the case may be, for direct wheat, doing all the receiving, handling, storing, loading in, loading out, including the bearing of the responsibility for losses in weight and deterioration at a flat rate contract allowance on all wheat of 1⅛d. per bushel. For the protection of the wheatgrowers all wheat will, however, be classified and weighed by Wheat Board's representative. The classification will be on the same basis as that which has obtained during the last two years, excepting with such modifications as may be mutually agreed upon.

6. The Board will bear costs of administration, interest on sheds, interest on bank overdraft, &c., but it is expected that, as a result of the arrangement which has been concluded between the parties, a very considerable economy in handling costs will be effected.

7. Millers have agreed to make available for the storage and protection of the wheat their entire mill storage capacity, estimated to be sufficient to safely house approximately 1,500,000 bushels. The Wheat Board has storage for approximately 2,100,000 bushels. The mills have a gristing capacity during the three months receiving season of anything up to 1,000,000 bushels unless there is undue uneconomic location. It appears, therefore, that sufficient storage exists to effectively protect and care for a 4,000,000-bushel crop. With a view to further ensuring adequate protection the existing Wheat Board's sheds will be mouse-proofed. Moneys for this purpose will be made available to the Wheat Board under the guarantee of the Government. In consideration of the millers making available their storage accommodation free of charge, the Wheat Board's sheds in the country are to be available free of charge to the millers. Acting as agents for the board and included in the flat rate charge of 1⅛d per bushel, millers will temporarily dump wheat in rush periods and bear responsibility therefor. The millers also agree to take delivery of wheat promptly from farmers and as fast as they can deliver it, subject to avoidance of congestion.

8. The board will receive payment for wheat from the millers weekly on Tuesday of each week for the gristings up to Saturday of the previous week.

9. The millers' accounts in the transactions will be subject to audit by the Auditor-General.

10. With respect to any surpluses of wheat which may be produced over and above the local consumption demands, it has been arranged that the local millers will have the first refusal of such surpluses at a price to be mutually agreed upon. This is with a view to building up the local milling industry without prejudicing local wheatgrowers.

11. Millers will deposit cash or bonds based on their gristing capacity as a guarantee that they will carry out the terms of the agreement, the total amount thereof being £30,000.

12. With a view to promoting mutual understanding between the parties, a monthly conference will take place between the Wheat Board and the millers alternately at Brisbane and Toowoomba during the wheat receiving months of November to February.

13. Provision has also been made in the agreement for a system of arbitration to enable the prompt settlement of any differences.

14. It has been agreed that any abnormality in Queensland and New South Wales will justify a reconsideration of the price formula, and a tribunal is set up in that connection.

15. There is also an annual right of review of certain provisions.

The agreement between the parties was duly completed and signed, and those concerned appear to be satisfied with the results.

Million Pound Credit.

It will be remembered that the Premier (Hon. A. E. Moore) announced in his policy speech that the national credit would be placed behind industries which were prepared to adopt self-help methods to bring about development without unduly leaning upon the Government. Since the primary and secondary sections of the wheat industry have so united in a common objective, the Government feels justified

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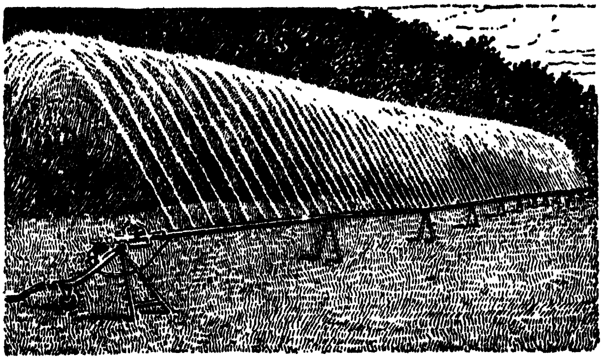

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in extending assistance along the lines promised by the Premier in his policy speech. The Government has therefore arranged with the Commonwealth Bank for a credit of £1,000,000 sterling per annum for the Wheat Board. The Government will also guarantee a first advance of 4s. per bushel *net to the grower* at country stations on all wheat of approved quality for the next three years up to 4,000,000 bushels. The moneys will be available to enable the growers to receive payment promptly, and if the board so wishes credit will be available so that growers who deliver wheat up to the 31st December will receive payment in the middle of January. Deliveries during January can be paid for in the middle of February, and February deliveries in the middle of March, in a similar manner to butter-factory pays. It has also been arranged that the millers will take over at the 15th September in each year any wheat remaining in stock, and will pay for same promptly so as to enable final distribution to be made to growers in the middle of September of each year. The arrangement means that not only will the grower be assured of a substantial first advance promptly after delivery, but also of an early squaring up of the pool, with an assurance to him of the full value of the wheat based on world parity plus Queensland's natural geographical advantage.

MODERN METHODS OF FARMING PRACTICE.

It is hoped that the arrangement may encourage farmers in districts suitable to wheatgrowing to plan the preparation of extended acreages during the coming summer. I hope they will prepare the land well and in such a way as to conserve the summer rainfall so as to provide a good seed-bed for an extended sowing under favourable conditions in next year's planting season.

Not only have the Departmental activities demonstrated the practicability of regular production of wheat crops in Queensland, but many individual growers have been meeting with consistent success over a term of years by the adoption of modern methods of soil-moisture conservation. In order to further assist in this important matter I have arranged to extend the activities of the Roma State Farm, and will endeavour to arrange for a series of conferences of delegates from Local Producers' Associations to be held there at suitable times when the results of experiments may be brought definitely under notice. This will be in addition to the field days recently arranged. The system of conducting experimental plots on individual farms will be continued and extended where practicable. Every encouragement will be given to the more widespread adoption by farmers of dry-farming methods. The existing departmental arrangements regarding the propagation of varieties of wheat suitable for Queensland will be energetically continued.

More Land under Wheat

I have arranged with my colleague, the Minister for Lands (Hon. W. A. Deacon), who is intimately familiar with the wheatgrowing industry, to initiate a survey of the lands available for closer settlement for wheatgrowing. I feel that there are many farmers' sons on the Darling Downs to-day, who, instead of coming to the cities to compete on the labour market, if given encouragement, would take up wheatgrowing, to their own benefit as well as to the great advantage of the State.

MINISTER'S APPEAL.

I also call the attention of the public of Queensland to the fact that Queensland millers can assist the wheatgrowers in the finding of an extended local market for their product only if Queensland people will ask for and give preference to bread made from Queensland flour. It has been demonstrated that Queensland flour is stronger and generally superior to many Southern flours. In asking for preference for the Queensland article, I am not, therefore, asking for preference for an inferior article but for one which (according to experts) is superior. I also appeal to the Queensland merchants and bakers. I ask them to be loyal to the State in which they earn their livlihood, and accordingly in placing their orders to give preference to those Queensland mills which are giving preference to Queensland wheat.

It now remains to hope for the favourable rains which are now so necessary to ensure a bounteous season so that those wheatgrowers who at present have substantial areas under crop may be rewarded to the full extent which their labours deserve, and that they may be encouraged to continue the valuable work which they are doing.

CLIMATOLOGICAL TABLE—SEPTEMBER, 1929.

SUPPLIED BY THE COMMONWEALTH OF AUSTRALIA, METEOROLOGICAL BUREAU, BRISBANE.

Districts and Stations.	Atmospheric Pressure. Mean at 9 a.m.	Shade Temperature. Means. Max.	Means. Min.	Extremes. Max.	Date.	Min.	Date.	Rainfall. Total.	Wet Days.
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Points.	
Cooktown	30·04	82	71	84	20, 29	57	12	26	5
Herberton	..	75	52	84	21	30	12	28	4
Rockhampton	30·13	80	56	89	19	43	11	3	1
Brisbane	30·16	74	54	86	18	48	3	48	8
Darling Downs.									
Dalby	30·15	77	47	88	21, 22	31	3	8	3
Stanthorpe	..	67	39	82	21	27	3	82	7
Toowoomba	..	69	46	81	21	32	3	36	4
Mid-interior.									
Georgetown	30·02	89	58	96	8,22,23	45	13	0	..
Longreach	30·08	83	54	93	21,25,26	39	11	0	..
Mitchell	30·14	77	45	88	20, 26	29	3	4	1
Western.									
Burketown	30·03	85	60	95	22	48	5	0	..
Boulia	30·09	84	55	97	20	40	3	0	..
Thargomindah	30·13	77	52	94	20	39	4	93	3

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF SEPTEMBER IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING 1929, AND 1928, FOR COMPARISON.

Divisions and Stations.	Average Rainfall. Sept.	Average Rainfall. No. of Years' Records.	Total Rainfall. Sept., 1929.	Total Rainfall. Sept., 1928.
North Coast.	In.		In.	In.
Atherton	0·68	28	0·19	0
Cairns	1·71	47	0·96	0·10
Cardwell	1·57	57	0·51	0
Cooktown	0·60	53	0·26	0·16
Herberton	0·50	42	0·28	0
Ingham	1·55	37	0·39	0
Innisfail	3·64	48	1·81	0·02
Mossman	1·54	16	0·76	0·11
Townsville	0·85	58	0·17	0
Central Coast.				
Ayr	1·51	42	0·20	0
Bowen	0·86	58	0	0
Charters Towers ..	0·78	47	0·10	0
Mackay	1·64	58	0·24	0
Proserpine	2·26	26	0·18	0
St. Lawrence.. ..	1·29	58	0	0
South Coast.				
Biggenden	1·59	30	0	0·29
Bundaberg	1·68	46	0·18	0·15
Brisbane	2·01	78	0·48	0·78
Caboolture	1·91	42	0·36	0·20
Childers	1·86	34	0·11	0·57
Crohamhurst ..	2·70	36	0·35	0·25
Esk	2·20	42	0·45	0·82
Gayndah	1·58	58	0·08	0·19
Gympie	2·14	59	0·12	0·24
Kilkivan	1·75	50	0	1·21
Maryborough ..	1·96	57	0·86	0·41
South Coast—continued:	In.		In.	In.
Nambour	2·63	33	0·33	0·42
Nanango	1·84	47	0·17	0·09
Rockhampton ..	1·36	42	0·03	0
Woodford	2·25	42	0·20	0·60
Darling Downs.				
Dalby	1·72	59	0·08	0·15
Emu Vale	1·79	38	0·28	0
Jimbour	1·54	41	0·15	0·02
Miles	1·40	44	0·11	0·03
Stanthorpe	2·33	56	0·82	0·36
Toowoomba ..	2·18	57	0·36	0·26
Warwick	1·83	64	0·34	0·02
Maranoa.				
Roma	1·49	55	0·01	0
State Farms, &c.				
Bungeworgorai ..	1·09	15	0·02	0
Gatton College ..	1·60	30	0·20	0·14
Gindie	1·07	30	0	0
Hermitage	1·54	23	0·24	0
Kairi	0·67	15	0·45	0
Mackay Sugar Experiment Station ..	1·58	32	0·02	0
Warren	0·89	14	..	..

GEORGE G. BOND, Divisional Meteorologist.

PARALYSIS OF THE HINDQUARTERS IN PIGS.

E. J. SHELTON, H.D.A., Instructor in Pig Raising.

The disease described by Mr. Shelton in the following notes is often called erroneously Staggers or Rickets, while other terms used to indicate a similar condition are Down in the Back, Kidney Worms, or Paralysis.

The ailment is largely a "deficiency" disease, one almost entirely due to an insufficient supply of mineral matters (bone-making materials) in the food and to lack of green food. It is obviously a subject that must be handled more along the lines of prevention than actual treatment; one coming within the ambit of the instructor more than the inspector, and one that must be remedied more by an all-round improvement in the system of breeding, feeding, and handling than by the administration of medicine. Mr. Shelton's observations on the subject are therefore of unusual interest. These notes appeared originally in the Journal for November, 1927, and in response to numerous requests for information on the subject they are now reprinted with the approval of Major A. H. Cory, M.R.C.V.S., Chief Inspector of Stock.—Ed.

Numerous inquiries reach the Department annually as to the cause and treatment of this all too common and very peculiar disease, if such it might be called. The subject has been dealt with previously in this Journal as well as in pamphlet form, but as both leaflet and pamphlet are now out of print, and as the trouble is of such an important nature, it warrants revision and repetition—this especially as further evidence of a very helpful nature has lately been received through official channels and from correspondence overseas.

A great deal has been written regarding "Paralysis of the Hindquarters in Pigs" and much research work has been carried out, principally with a view to ascertaining the exact nature of the conditions under which the disease occurs, and in studying the subject it is of interest to know just what other authorities are doing, and to determine whether or not their findings are applicable to our conditions in Queensland.

The disease is very largely one due to a deficiency of mineral matters in the food and to malnutrition, hence the writer's objective is to suggest how by improved methods of feeding and caring for pigs these abnormal conditions can be overcome. The Veterinary Officers of this Department should be consulted on all matters relating to medicinal treatment; their advice is also always available in case of any outbreak of disease no matter whether it be of a minor or of a more serious nature.

Paralysis of the hindquarters in pigs is, unfortunately, a trouble not confined to young pigs only, nor is it localised in Queensland. It appears to be a source of considerable trouble wherever pigs are kept the world over, though where the conditions under which pigs are kept are favourable to early maturity and to the healthy and rapid growth of all breeding stock, the disease has been kept in check and has caused but little trouble.

In referring to the occurrence of paralysis in pigs in this State and elsewhere, the Chief Inspector of Stock, Major A. H. Cory, M.R.C.V.S., states that—

"The subject of paralysis in pigs has been given considerable attention for many years past.

"A small leaflet was issued some years ago to farmers dealing with what was then considered three principal causes of the complaint, but in recent years it has been ascertained that the paralysis, in many cases, is due to the lack of a vitamine known as Fat Soluble A, which is essential to the growth of animals, a deficiency leading to rickets.

"This vitamine is found in certain herbage, milk, cream, butter, eggs (yolk), beef fat, and cod liver oil. Latterly cod liver oil has been recommended to make up for the vitamine referred to, with, as far as can be ascertained, marked benefit.

"There is little to report regarding the incidence of the disease, as it occurs in any part of Queensland where pigs are improperly fed and not given the necessary attention. The same conditions exist all over the civilised world. It is mostly young growing pigs which are affected, and generally those in good condition.

"Apart from the paralysis, the pigs usually feed well and appear normal, the pathological changes taking place being apparently microscopical."

Professor L. A. Maynard, of the New York State College of Agriculture, Department of Animal Husbandry, has written on the following lines as a result of his experience:—

"This problem has been under investigation here for several years. On the basis of our studies, we believe the trouble is the result of improper mineral nutrition which prohibits a normal development of bone. This is due to a lack of calcium in most of our rations. We have shown that where paralysis occurs, the long bones are very deficient in calcium and phosphorus, and marked histological changes have occurred. These changes have been observed on a diet low in calcium. However, a lack of calcium is not the only factor involved, because the question of assimilation also comes in.

"Certain feeds are rich in the factor aiding mineral assimilation, and certain others are not. A ration which contains a certain amount of chopped alfalfa (green lucerne or lucerne chaff) is very useful for preventing paralysis, because it supplies the needed calcium and phosphorus and the factor aiding assimilation as well. We have shown, however, that there is a very beneficial effect from the adding of ground limestone and bone meal to rations which are now causing the trouble."

In a communication from Professor R. Adams-Dutcher, Head of the Department of Chemical Agriculture at the State College and Experiment Station, Pennslyvania, U.S.A., the following remarks appear:—

"I have the feeling from the knowledge that I have been able to obtain by reading, and in experimenting, that the diet is a very important factor in preventing paralysis in pigs, and probably calcium and phosphorus accompanied by proper vitamine-carrying foods are the most important dietary factors. Any number of animals have been relieved of the paralytic symptoms by feeding bone meals or other mineral mixtures carrying calcium and phosphorus; mixtures which carry calcium carbonate have also been effective. Veterinarians in New York have had fairly good success with wood ashes, but it is my recommendation that lime or bone meal be made available in those districts where hog paralysis is causing trouble. If lucerne or some other leafy green stuff or hay is available, this would also improve the situation, helping the animals to utilise this mineral matter to the best degree of efficiency."

The following extracts have been taken at random from mineographs supplied by Professor John M. Evvard, as a result of extensive experiment along the lines of feeding mineral mixtures, both simple and complex, to pigs not only with the idea of preventing paralysis, but of stimulating growth and enhancing the returns.

Comment.

(1) The feeding of minerals in whatever form allowed was quite advantageous in that the average daily gains were substantially increased, the length of the feeding period economically shortened, the feed required per 100 lb. gain considerably reduced, and the profits per pig enhanced.

(2) In feeding experiments the appetites of pigs for minerals is shown to be of considerable reliability, inasmuch as they clearly excelled check groups receiving no minerals.

(3) Although there appears to be some advantage gained from the feeding of a mineral mixture carrying more than the single-emphasised ingredients, such as common salt, calcium carbonate, bone ingredients, and potassium iodide, yet just how far one can afford to go in the adding of other ingredients in practice is a matter for individual estimation and determination. Our experience has certainly indicated that some of the main ingredients necessary in the mineral mixtures are those that carry sodium and chlorine (common salt), calcium (lime, limestone, and bone materials), phosphorus (bone materials, rock, and other phosphates), and iodine (potassium or sodium iodide). The further addition of suitable combinations of such ingredients as common sulphur, a little charcoal, some Glauber's salts, as well as some other ingredients in small percentages or quantities has, on the whole, shown some benefits in our experimental work.

(4) It appears as if the farmer in his feeding of sulphur, charcoal, and other often-questioned materials has not gone entirely wrong, and like his well-founded belief in yellow corn (as against white corn), we should be sure of our grounds before declaring them or any of them non-beneficial.

(5) Our other work with minerals has shown the dollar and cents practicability of adding a good mixture of mineral ingredients to many ordinary pig rations.

(6) Our general recommendation is to provide a suitable mineral mixture for all classes and grades of pigs—the growing pigs, the breeding sow, the suckling pigs, the boars and all—and it is our suggestion that the mineral mixture be self-fed in an easily accessible place, well protected, and under shelter if possible.

(7) A good mineral mixture may be made up for practical everyday feeding as follows:—

> Common salt, 20 per cent.; finely ground raw bone meal, or steamed bone meal, or spent bone black, or rock phosphate, or acid phosphate, 40 per cent.; finely ground high calcium limestone, or wood ashes, or finely ground oyster shell, or lime thoroughly air slacked, 40 per cent. Total, 100 per cent.

If sulphur is desired, add approximately 10 lb. to the 100 lb. To every 100 lb. of the above minerals, add from ½ to 1 oz. of potassium iodide, mixing all ingredients thoroughly.

The following remarks upon this disease form the conclusions arrived at by Dr. J. W. Connaway, a prominent American veterinarian, who has been associated with many of the experiments relating to this particular trouble:—

Paralysis of the hindquarters in pigs may result from one of several causes, and the treatment will vary to some extent, according to the cause of the paralysis. The causes are—(1) Injuries; (2) impaction of the lower bowels; (3) kidney worms; (4) heavy suckling; and (5) lumbago or rheumatism. Each of these causes and the preventive and curative measures are discussed in order as follows:—

Paralysis from Injuries.

If the pig has been running in the same yard with horses, mules, or cattle, it may have been kicked, pawed, horned, or trodden upon, and sustained an injury to the spine, legs, or muscles of the back or hips.

Treatment.—Make a thorough examination of these parts. Sometimes an injury is deep-steated and can be detected only by firm pressure and other manipulations of the paralysed parts which produce evidence of pain, fractures of bones, or rupture of tendons and muscular tissues; or the pressure of deep-seated abscesses. If the paralysis is due to an injury, the best treatment is absolute rest. Put the patient under shelter in a comfortable pen, where it can be bedded and kept quiet. Feed a light laxative diet and keep the pen and bedding clean. After a time, a stimulating liniment rubbed over the injured parts may hasten recovery. A mixture of equal parts of turpentine, ammonia, and cotton-seed oil makes a very good liniment. An abscess should be opened and be given proper antiseptic treatment.

Paralysis from Impaction of the Bowels.

Paralysis of the hindquarters may result from an impaction of the lower bowels with hard masses of dung, causing excessive pressure upon the nerves and blood vessels in the pelvis or hip region. If the paralysed pig seems to be badly constipated, use rectal injections of warm water to soften and remove the hard lumps of dung. Add a couple of tablespoonsful of Glauber's salts to slops (food) and feed twice daily until the bowels are loose. Impaction is most frequently due to improper feeding, and to lack of tone of the bowels. A properly balanced ration with an adequate supply of water will prevent impaction of the bowels. In cold weather, pigs frequently do not have a proper supply of water. If the water is icy cold, pigs do not drink a sufficient quantity and are liable to become constipated. Some provision should be made for warming the water to take off the chill. A warm slop once a day will be helpful in keeping the bowels of the brood sow in good condition.

The following tonic will also be found useful:—Equal parts of pulverised copperas, Glauber's salts, Sal. soda, common salt, and a double portion of powdered charcoal, which should be thoroughly mixed and put in a covered trough (self-feeder), where all the pigs can have free access to it.

Paralysis from Kidney Worms.

The so-called kidney (or lard) worms "Stephanurus dentatus" (also called "Sclerostoma pinguicola") may cause paralysis of the hindquarters if these worms are present in large numbers in the sublumbar or loin region. These worms, in the embryo stage, migrate into the fatty tissues around the kidneys, and sometimes into the kidneys and other organs, as the liver and pancreas. They produce inflammation, and at times abscesses, in the tissues where they lodge. As they are found in largest numbers in the kidney fat and loin region where the nerves are given off from the spinal cord to the hindquarters, the functions of the nerves of this region are more likely to be affected by these parasites and their toxic products.

Treatment.—A brisk rubbing or massage of the loin muscles, with an application of the liniment already mentioned to stimulate the nerves and increase the blood circulation of the affected region will be helpful. Turpentine should also be given internally; this will destroy many embryo worms in the intestines. As turpentine is very diffusible, it is believed to be useful in destroying these parasites in the tissues around the kidneys. To a 200-lb. pig give a tablespoonful of turpentine in half a pint of oil (cotton-seed or raw linseed); or warm milk may be substituted for oil. Shake well before using. Use a small necked bottle, drenching horn, drenching bit, or old leather shoe with a small hole cut out in the point, and give the drench slowly, or smaller doses may be added to the slop (food). The following worm remedy is also useful:—Santonin 6 grains, calomel 4 grains; this quantity to a bacon pig 100 lb. live weight or twice the amount to a pig weighing 200 lb. or more live weight.

In every case, the bowels should be completely emptied before the medicine is given. The Santonin (or Areca Nut may be used in similar quantities) and calomel should be mixed thoroughly with a small quantity of dry meal or shorts (pollard), which may then be moistened and fed alone, or the meal and medicine may be stirred into the feed or slop. Repeat the treatment in a few days.

As a preventive, use freshly slacked lime liberally over the pig yards to destroy worm embryos on the ground over which the pigs feed. Give the pig yards a thorough lining and clean up several times in the year.

Paralysis from Heavy Suckling.

Brood sows that do not have a proper ration, or that are not able to utilise it effectively, sometimes go down in the hindquarters from suckling a big litter of rapidly-growing pigs. The rapid growth of the pigs requires considerable protein for muscle building and considerable bone-making material. All this must be supplied through the milk of the mother, and if the sow is not given the correct ration, her own muscles and bone tissues are depleted to supply proper elements for the growth of her pigs and the weakened condition mentioned results. This can usually be prevented by giving a food rich in protein and bone-making materials along with a corn ration. Protein supplements, such as "tankage" (meat or blood and bone meal), and linseed meal, should be provided. Protein may also be supplied by leguminous crops—clover, alfalfa (lucerne), cowpeas, and soy beans. Brood sows that have access to a feeding rack that is kept full of "pea green" lucerne or other legumes will have no trouble in supplying their pigs with both muscle and bone-forming materials, and will not be in much danger during their lactation period of going down in the hindquarters from too heavy a drain on their tissues. A little crushed wheat or corn and bran made into a slop with buttermilk is an excellent prescription, especially for sows that are low in condition from suckling large litters of pigs. Heat the milk nearly to boiling point for a few minutes before adding the grain constituent; this will prevent any possibility of transmitting tuberculosis or other diseases to the brood sows through cow's milk.

Paralysis from Lumbago or Rheumatism.

A board off the pig pen may permit a cold draught to blow on the back of the pig at night. This chilling of the loins may produce lumbago, or temporary paralysis of the muscles of the hindquarters and inability to walk. Comfortable sleeping quarters prevent these troubles (as well as pneumonia, &c.). It is a mistaken notion that the thick layer of fat with which pigs are provided is sufficient protection against winter storms. On the contrary, pigs often suffer severely from cold and wet if not properly sheltered and properly bedded. If the pigs are affected with lumbago and rheumatism, clean out the bowels by means of a brisk purge (two to four tablespoonfuls of Glauber's or Epsom salts administered in a pint of warm water). Cut down the protein constituent of the ration; feed thin, warm slops to which baking soda is added in tablespoonful doses. Apply hot packs to the loin and paralysed limbs, massage the muscles and apply a stimulating liniment with brisk rubbing. Bed warmly and cover the body of the patient with a thick horse rug if the weather is cold.

A Peculiar Ear Disease Possibly Mistaken for Paralysis.

Reference has also been made on several occasions in these columns to investigations that have recently been carried out by H. R. Seddon, D.V.Sc., and H. R. Carne, B.V.Sc. of the Veterinary Research Station, Glenfield, New South Wales (as reported in the "Agricultural Gazette" of New South Wales), these investigations having as their objective the determination of the cause and effect of a peculiar disease technically known as suppurative otitis affecting the ear of the pig, the principal symptoms of which are the abnormal carriage of the head and the interference with equilibrium and sense of direction. This disease—which, unfortunately, also is all too common in Queensland and is frequently mistaken for paralysis or as indicating the development of paralysis of the hindquarters—has been described by these veterinarians as follows:—

A condition has been noticed fairly commonly amongst young pigs in which the most prominent symptom is a peculiar alteration in the carriage of the head, which is accompanied frequently by unsteadiness of gait. The disease is seen usually in young pigs from a few weeks up to three or four months old. The reason for the relative infrequency of occurrence in older pigs is possibly that young pigs are more prone to catarrh (which appears to be the forerunner of the condition) and that affected animals suffer such loss of condition that they die or are killed as "runts" or "bad doers."

Symptoms.

The most characteristic symptoms are the abnormal method of carriage of the head and the interference with equilibrium and sense of direction. The head is twisted or rotated to one side or the other so that one ear (the affected one) is depressed, such depression becoming more marked as the condition advances. It is noticed that the animal, when walking about, tends to circle in one direction, this being towards the side to which the head is depressed. For example, if the left ear is affected, the head will be rotated to the left with depression of the left ear and "circling" will occur in the same direction. At times this tendency to circle is not apparent, but it is noticed that when moving, the animal does so with an awkward gait, whilst the head is moved from side to side in an unbalanced manner. Affected animals may also exhibit considerable difficulty in going straight up to the feeding trough, having to make several attempts before gauging the right direction, sometimes walking to one side of the trough and sometimes to the other. It has frequently been noticed that the condition is accompanied by discharge from the nostrils and eyes.

In advanced cases there are very apparent disorders of equilibrium, the gait becoming unsteady and somewhat inco-ordinated, and the animals may fall into the feed trough and be unable to get out again.

Affected pigs are usually found to be "poor doers" showing a scurfy condition of the skin, lack of lustre of the hair, and poor condition. The appetite is capricious. In some cases examination of the affected ear reveals a considerable amount of yellowish brown or brown sticky discharge adhering to the inner surface of the ear.

Cause and Lesions.

Examination of several pigs showing such symptoms has revealed the presence of a suppurative condition affecting the middle ear, and this may be the only demonstrable pathological change found on post-mortem examination.

The hearing apparatus, it may be mentioned, consists essentially of three parts:—

(1) The external ear, which is that portion visible externally. Its function is to collect sound waves and transmit them by means of a passage to—

(2) The middle ear: This is separated from the external ear by the tympanic membrane or "ear-drum." The function of the middle ear is to magnify the sound waves collected by the external ear and transmit them to—

(3) The internal ear: This consists of an intricate structure by which the sound impressions are transmitted to the sensory areas of the brain. The internal ear, however, performs another very important function—namely, the maintenance of equilibrium, it being by means of part of this structure that an animal keeps its balance. Disease of these deeper structures of the ear, therefore, frequently leads to an unsteady gait, twisting of the head to one side, or even to inability to stand at all.

Both the middle and internal ears are situated within the petrous-temporal bone of the skull and it is within this bone that the lesions responsible for the condition are found. The petrous-temporal bones are placed immediately behind the articulations of the lower jaws and the skull, but a careful dissection by sawing open the skull along the longitudinal mid-line and removal of the brain is necessary to expose them properly.

In several cases so examined, it has been found that a thick, cheesy material is present in the cavities of the bulbous portion (*bulla ossea*) of the middle ear on that side to which the head has been depressed during life. Normally, these cavities in the bone have a honeycombed appearance, consisting as they do of small, empty spaces separated by thin plates of bone.

The accumulated pus in the middle ear tends to burst through the ear drum and discharge externally, giving rise to the sticky discharge which may, in advanced cases, be seen on examination of the passage in the external ear.

Examination of the pus shows the presence of bacteria, such as are commonly met with in other suppurative conditions in the pig. It is probable that in these cases they gain entrance to the deeper structures of the ear by way of a narrower passage (called the Eustachian tube) which leads from the back of the throat to the middle ear, and from the comparative frequence of nasal catarrh in young pigs, it is probable that this ear disease is an extension of this inflammatory process affecting the lining membrane of the nasal passages.

Prevention and Treatment.

Once the condition is established, it is unlikely that any treatment will be of use. Syringing of the outer ear will remove the obvious discharge, but will not penetrate into the deeper structures from which the pus arises. While the discharge cannot be definitely prevented, all possible means, such as proper attention to cleanliness and housing, should be undertaken in order that chills may be avoided. Diet should also be attended to, as it is found that this also plays a not unimportant part in the causation of those diseases, such as catarrh (snuffles) and pneumonia with which the condition is frequently associated.

More Efficient Feeding Necessary.

As will be noted from the remarks of the authorities referred to above, both in regard to the condition, paralysis of the hindquarters, and to that more recently described by Doctors Seddons and Carne, it is apparent that any form of treatment must be preceded by a general clean-up of all the piggery buildings, yards, paddocks, &c., careful attention to breeding, and to the selection of reliable, healthy strains of pigs with which to stock up farm piggeries, to a more efficient system of feeding pigs, and to the use of mineral matters in the food given to pigs of all ages. It will be noted that special emphasis has been given throughout to the consistent use of liberal supplies of green food, lucerne, rape and barley, corn, pumpkins and melons, sweet potatoes and other root crops, grasses, and to any other green foods available on the farm.

Mineral Mixtures.

The preparation and use of mineral mixtures is especially worth attention, for they will be found of great value in all seasons whether the supply of green food is available or not. In this connection the following recipes are suggested as being suited for use on all pig farms; the ingredients are reasonable in price, and are not difficult to obtain, and it should not be difficult for any farmer to arrange for a supply of these very necessary additions to the pigs' diet.

Mix together—Charcoal, 20 lb.; hardwood ashes, 20 lb.; coarse salt, 8 lb.; air-slaked lime, 4 lb.; flour of sulphur, 4 lb.; powdered copperas (sulphate of iron), 2 lb.

Prepare as follows:—First mix the lime, salt, and sulphur thoroughly, then add the charcoal and ashes. Dissolve the copperas in two pints of hot water and sprinkle over the whole mass, mixing thoroughly.

Keep some of this mixture before the pigs at all times in a strong box securely fastened in a weather-proof corner of the sty. Provide ample clean cold water at all times.

Lime water should be added to the morning feed, using half a pint to each two gallons of food. It will also pay to add a few ounces of sterilised bone meal to the food of the growing pig. This meal can be ordered specially for this purpose from any of the leading dealers in artificial fertilisers or from firms like Messrs. Thos. Borthwick and Sons (Australasia) Ltd., Wharf street, Brisbane, who also manufacture meat meal—a protein supplement of much value, and Bonolik, a mineral mixture. It may seem that these condiments are expensive and unnecessary, but in actual practice they will give a handsome return on the outlay, though it might be difficult to demonstrate this in actual pounds, shillings, and pence.

The provision of these mineral mixtures will satisfy the pig's desire for mineral substances and will prove of added value as a tonic and appetiser. Salt licks, Vita licks, &c., also are now available on the market, and are becoming increasingly popular each year.

Minerals are just as important in the growth and development of the pigs as are proteins, carbohydrates, fats, vitamines, ash, water, and other nutrients, and more attention should be given to their provision, because, as a rule, insufficient quantities are present in the ration.

All pig rations, of course, contain some minerals, but there are practically no pig rations, unless specially prepared, that contain an adequate quantity to meet the requirements of the pig's body. Pigs need minerals for the building up of bone, for making muscle, for cell division, and for carrying on of innumerable physiological functions.

Without minerals, growth and development will be restricted, and the pigs will be less profitable. Many pigs suffer because they receive inadequate quantities of minerals, but no pigs suffer because too large quantities are given to them. Consequently, we should see that our growing pigs have access at all times to a good mineral ration balancer.

Corn Cob Charcoal.

A good use for the corn cobs (cores) that have always been allowed to accumulate on most farms and around piggeries is to make charcoal of them. The cores in themselves do not make a good feed for pigs because of their high and coarse fibre content, and even if the whole cob (corn and core as well) is ground, it has yet to be proved that there is an added value in them. The core is practically indigestible fibre that only burdens the pig's digestive organisation and causes indigestion.

After the pigs have taken all the corn from the cob, however, the waste cores can be raked together into a pile and burned to the point when it is all a live mass of coals. Water should then be sprinkled over the pile to put the fire out, and the partially charred cores gathered up for the pigs. If there are any other "chips" available, or any old corn husks, these should also be gathered and burned, and added to the charcoal made from the cores.

Some of the farmers in the "Rivers" district of New South Wales have for years followed this practice, and in these days when suction gas plants are in use to such an extent, quite a large trade has sprung up for the charcoal burner. In this case large pits are dug in the ground and suitable lengths of logs are pulled into these; they are then fired, and after a time are covered with earth. In a few days' time a good class of charcoal results. These farmers have been making good money, and, at the same time, clearing their holdings.

It pays also to burn all old bones, waste timber, &c., and thus convert these into a form of charcoal.

Provide More Water.

The water supply should have special attention, for certain it is that many pigs do not have a sufficient supply of clean drinking water, and, as a general rule, pigs from a few days old upwards will be found to appreciate liberal supplies; it is surprising how much water a pig a month old will drink if he has the opportunity of securing a supply.

Careful Handling in Transit.

Many pigs are handled so roughly in transit to market that they arrive at the markets, factories, &c., down in the back or otherwise disabled.

The writer has seen hundreds of cases like this in which the animals have been unable to walk from the railway trucks. The industry suffers heavy losses each year as a result. It should be the duty of every farmer to see that not only his own, but that all other animals in transit to market are handled carefully, and that no undue haste is made in rushing the animals into the trucks or other means of conveyance.

The Condition of the Breeding Sow.

Reference has been made above to the fact that frequently breeding sows suffer from paralysis of the hindquarters as a result of loss of vitality and condition from suckling a large litter of active, vigorous pigs. In this regard it is necesary that the breeder should know the correct condition in which to maintain his breeding sows.

Figures shown represent sows that are too low in condition to farrow and rear their litters successfully. These sows would, in all probability, suffer severely as a result, and their progeny could not be regarded as having the same chance as the progeny of the sows illustrated which represents the normal condition of breeding sows, the condition in which a sow should be maintained for best results; sows that are too fat are likely to have trouble at farrowing time, and their progeny will frequently prove to be weak, puny, and unable to battle for themselves.

The importance of diet and the necessity for careful attention to all details of management are strikingly illustrated in the plate from Henry and Morrison's latest book on "Feeds and Feeding."

Overfeeding Young Pigs on Corn—A Cause of Paralysis of the Hindquarters.

The importance of properly balanced rations cannot be too strongly stressed. Many bacon pigs suffer from paralysis of the hindquarters as a result of being overfed on a ration consisting almost exclusively of corn and water or even of corn and milk; in fact, many authorities condemn the use of corn as a food for young pigs, but the writer's experience demonstrates that, provided corn is fed in comparatively small quantities during the early stages and is well balanced up with liberal supplies of milk, green stuff, &c., that it can be fed to very considerable advantage to all classes of pigs. In these days there is no demand for heavy fat bacon, hence there is no profit in over-feeding pigs on expensive grains, though some grain is necessary, especially in the case of young growing pigs.

Departmental Suggestions.

Paralysis in pigs is brought about by several causes in addition to the other causes referred to above—viz., deficiency of vitamines, &c. In these cases the following lines of treatment are suggested:—

Treatment.

If due to rheumatism, see that the pigs are housed at night in a dry place, and allowed to sleep on wood flooring instead of on concrete or earth. Give daily salicylate of soda 15 to 30 grains, and bicarbonate of potash 1 to 2 drachms, in the food or as a drench.

If due to worms give, in the food or as a drench, 1 teaspoonful of oil of turpentine, 20 drops of perchloride of iron, and 3 or 4 oz. of raw linseed oil. This is sufficient for 50 lb. body weight.

It should be given after the animal has been fasting for some hours, and can be repeated several times, with an interval of three or four days. When due to feeding, as mentioned above, stop the corn and give once daily in a mixed diet or in milk 1 dessertspoonful of the following powder for every 100 lb. body weight (after it has been well mixed and powdered):—Sulphur 2 oz., sodium bicarbonate 4 oz., sodium sulphate 2 oz., black antimony 2 oz., sulphate of iron 1 oz., wood charcoal 2 oz.

A useful mineral mixture well worth trial also is made up as follows:—Add 1 dessertspoonful of the following mixture to the food of each pig daily:—Sulphate of iron, 1 part; sulphur, 2 parts; sterilised bone meal, 10 parts. Very young pigs should receive about half these doses. The following excerpt is also of interest in studying this peculiar disease—paralysis of the hindquarters.

Causes.

When asked why pigs go down behind and suffer from a form of paralysis, Dr. K. W. Stouder, an Extension Service Specialist at the Iowa State College, U.S.A., said—

Weakness of the legs and back to such an extent that the animal is unable to stand is commonly seen among pigs. It is seen more often in recent years, perhaps, than it was some years ago.

We must not assume that it is all caused by the same thing, nor that all cases are exactly alike. In fact, they can easily be divided into at least two groups, the old sow that goes down and the growing store pig. Most sows go down after suckling a vigorous litter of pigs, and such cases are usually due to a lack of enough minerals, proteins, and vitamines in the rations to support the litter she raises and to provide for her own body-maintenance needs as well.

Many of these cases recover as the experienced feeder knows, if the patient is put on a ration of whole cow's milk every day, as it supplies the deficiencies, but it is more important to remember that this type of going down behind would not have occurred had the food ration been well balanced during the gestation period and while she was suckling her litter.

Young pigs may also go down because of the unbalanced rations, particularly it seems if the ration is low in mineral content and of the vitamines so essential to good health. It may also result from generations of breeding and selection, together with forced feeding for early maturity, rapid gains and excessive fat production, disregarding constitution, good bony framework and vigour. Cases of this kind are common, we believe, and they strongly indicate why these animals and their close relatives should be discarded as breeding animals to perpetuate the herd, for in such cases predisposition has much to do with its occurrence. Its occurrence one generation after another in certain families can thus be accounted for in part at least.

Some animals that go down show deficiency of bone; some show degeneration of nerves that control the muscles of the back and legs; others are found to suffer disease of the bony surfaces that come together at a joint, particularly where the thigh bone attaches to the body. These lastnamed cases of diseased joints may be the result of navel infection during the first few days after birth and could have been avoided had the pig been farrowed in a very clean place and kept under the cleanest surroundings, together with iodine or other antiseptic treatment of the navel until it dried up.

Difficulty of Diagnosis.

The treatment of these cases gives variable results, perhaps depending first upon the difficulty of diagnosing with certainty the exact trouble in each case presented for treatment. Some cases improve on a mineral mixture, especially if given calcium phosphate, and others do better on spoonful doses each day of cod liver oil because the latter is rich in vitamines.

It is suggested that breeding animals and growing animals be given well balanced rations, so far as providing plenty of protein is concerned in relation to the fattening foods; that minerals be kept available and a mixture of equal parts of air-slacked lime, salt, and bone meal by weight serves as good as any.

Preventive Measures.

When young pigs are born, apply tincture of iodine to the navel daily until it is dry. Don't keep even the relatives of the pigs that show this trouble for breeding purposes. When it occurs, give whole milk, cod liver oil, calcium phosphate, and carrots, if you have them available, in addition to a well-balanced ration, and some cases will recover, but there are those that never get up though appetite and general health otherwise seem good.

There are cases, of course, in which the ailment is due to accident. The treatment for these cases must be on common-sense lines, and must aim at keeping the animal in good heart and in otherwise healthy condition. There are other cases in which intestinal worms, and possibly kidney worms, are the direct or the indirect causes; these cases must receive a course of treatment that will tend to clear them of the parasites and put them in a condition to battle against future infestation.

Another American authority has this to say on the subject:—

"Professor L. A. Weaver, Swine Specialist of the Missouri (U.S.A.) Agricultural College, states that the two minerals most frequently lacking in the food for pigs are calcium and phosphorus. Experiments have shown that pigs are able to use these minerals when supplied either in an organic or inorganic form. In other words, ground limestone, which is calcium or lime phosphate, serves as well as a source of phosphorous as does wheat bran, where the phosphorus is in an organic form. Calcium may be satisfactorily furnished in almost any form, such as lime, ground limestone, or bone meal."

Included among suggested remedies by other authorities as well as by our own experience in handling animals in a paralysed condition are as follows:—

Where animals have the benefit of a grazing area, it would be an advantage, if possible, to subdivide this, allowing them to use only one portion at a time, the other portion resting and sweetening up meantime. Where the ground is at all swampy or low lying, some endeavour should be made to drain the area. It is on these low lying, swampy areas where infection from kidney worms or from intestinal worms would be suggested—hence the advisability of changing the pigs from one pasture to another frequently. Pigs infested with kidney worms, however, seldom recover normal condition, though they may appear perfectly healthy and have good appetites. There is, unfortunately, no external indication of the infestation unless paralysis be accepted as a definite symptom.

Results of Experiments.

A series of experiments carried out at one of the Agricultural Colleges in England demonstrated that pigs fed on an exclusive corn diet have a weaker bone than those having a better balanced ration. If, therefore, animals are receiving corn alone, other foods, especially skimmed milk and green foods (with minerals), should be added to make up the deficiency.

Within the last year or two, a very extensive investigation overseas regarding this disease, has demonstrated among other things that pigs affected with paralysis of the limbs have a broken down condition of the nerves that supply the muscles of the hind limbs with innervation. While it is possible that this is not always the case, still it was found in a large percentage of the patients examined, and as degenerated or broken down nerves cannot be restored to their full function, we are forced to come to the conclusion that paralysis of the hind parts of the pig is, in many cases, incurable. The cause of this breaking down of the nerves is not known, and, therefore, intelligent curative treatment cannot be recommended. Preventive treatment is always somewhat vague, but it is always well to separate the diseased from the healthy pigs, to disinfect all pens by spraying them or by the application by hand of limewash, and by avoiding the use of affected pigs or pigs closely related to them for breeding purposes, as there is some danger that there may be a hereditary predisposition to the disease.

In cases due to accident or injuries, common-sense methods must, of course, be employed in treatment. Meanwhile, the animal requires careful housing and a course of medicinal treatment to keep the bowels and bladder free. The food should be of a soft, nourishing nature. Allow water and green food also.

The use of cod liver oil appears to have the general recommendation of a number of investigators handling paralysed pigs. This oil given at the rate of one teaspoonful per pig (from 6 months old upwards) daily mixed in the food is suggested.

Another remedy recently suggested in dealing with the disease, as one due to a deficiency of mineral matters and to a lack of vitamines, indicates that something needed for nutrition is absent in the foods in use for the affected pigs. The Colorado Agricultural College authorities in answering an inquiry on these lines recently give this advice—"That as the foods being fed to the animals under review had on analyses shown a deficiency of minerals, and were particularly deficient in vitamine B., it was recommended to try feeding the pigs on a ration consisting of plenty of milk and carrots, using new milk for a start and skimmed milk later. Results under experimental work with this ration in case of pig paralysis have been remarkable.

An Incurable Form.

Paralysis resulting from tuberculous bones is incurable, and as the carcases would not be fit for human consumption the sooner they are destroyed the better. It is, of course, possible to test pigs with the tuberculin test, though this is not a very satisfactory business with pigs for the reason that it must be carried out by a competent veterinarian and the expense incurred would hardly be justified except in the case of very valuable stud pigs.

If there is any conclusive evidence that the animal is tubercular, he had better be destroyed immediately and be burned to ashes on the spot on which he is killed.

In addition to paralysis resulting from tuberculous bones, any abnormal condition affecting the spinal cord, such as abscesses, tumours, parasites, or even diseased and softened bones may be a primary cause for the trouble. Paralysis immediately following farrowing is, in our experience, not common, but it may result from a weakened condition of the animal and in cases of this description the preventive measures indicated should be adopted, as also in cases attributed to lumbago and rheumatism.

Early Signs of the Trouble.

As a rule, paralysis comes on gradually, being indicated in the first instance by a wobbly, uncertain gait, the animal failing to control its movements, particularly if hurried or if the animal is turning around. Walking gradually becomes more difficult as the weakening of the nerves and muscles of the hindquarters progresses, but in almost every instance the appetite and general health of the animal is not affected, hence any abnormal change in the appetite or any other indication of sickness must be looked to as premonitory of other and perhaps more serious troubles. Constipation must be relieved by repeated doses of Epsom salts or castor or linseed oils. Massaging of the affected muscles and the application of liniments as referred to above are suggested.

Finally it is suggested that in every instance where the trouble appears in more than one animal, or where it apppears that ordinary care and attention is ineffective in bringing about the desired result, the services of a qualified veterinary surgeon should be requisitioned to take complete charge of the case.

Plate 171 (Fig. 1).

A typical case of Paralysis of the Hindquarters. It will be noted that although paralysed in the hindquarters to the extent that she cannot raise her hind legs or use them in any other way the animal has not lost condition. Strangely enough, the appetite is not usually affected provided the animal is otherwise normal.

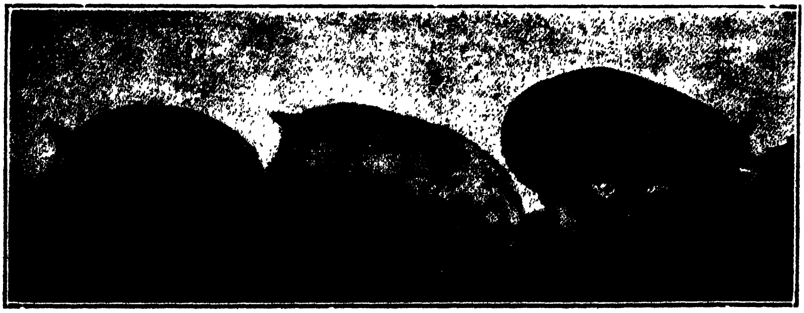


Plate 172 (Fig. 2).

These pigs are suffering from a very severe attack of paralysis of the hindquarters. The pig on the right is still able to move about but with great difficulty and a very uncertain gait, but as is the case with the other two is quite unable to control its movements. The photograph is of pigs fed on a ration containing a very low mineral content. Stiffness and partial loss of control followed after about six weeks' feeding. In the same experiment a second lot fed the same ration plus five times as much calcium phosphate as lot No. 1 had gained 89 per cent. more weight and were not affected with paralysis. Both lots were afterwards slaughtered. The skeletons of the pigs illustrated in Fig. 2 weighed 1,193 grams. That of the pigs fed in separate pen and which were given sufficient calcium phosphate weighed 2,371 grams, or 100 per cent. more.

PLATE 173 (Fig. 3).

Symptoms of posterior paralysis (breaking down in the back).

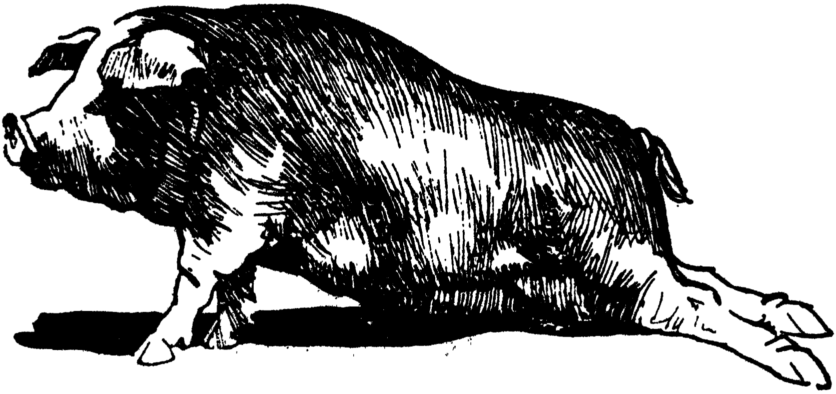


PLATE 174 (Fig. 4).

Illustrating a pig that has been injured in transit and unable to travel. Many pigs arrive at our bacon factories and saleyards in such a condition, resulting in their market value being reduced probably 75 per cent. This emphasises the necessity of giving careful attention to the animals in every stage, particularly in transit.

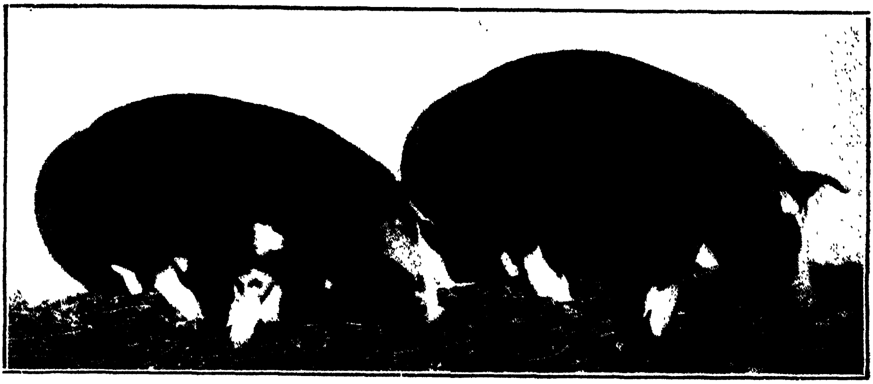


PLATE 175 (Fig. 5).—PIGS SUFFERING FROM SEVERE CASES OF RICKETS.

These pigs received a ration of white corn and skim milk, without pasture. Note the paralysed condition. The pig on the left died within a week after the photograph was taken, while the one on the right gradually recovered when cod liver oil was added to the ration.

(From Henry and Morrison's "Feeds and Feeding.")

These pigs are suffering from an advanced form of the disease Rickets, a similar condition to that referred to as paralysis of the hindquarters. The reference to this illustration emphasises the necessity of careful feeding and the provision of a liberal supply of mineral matters and vitamines in the food.

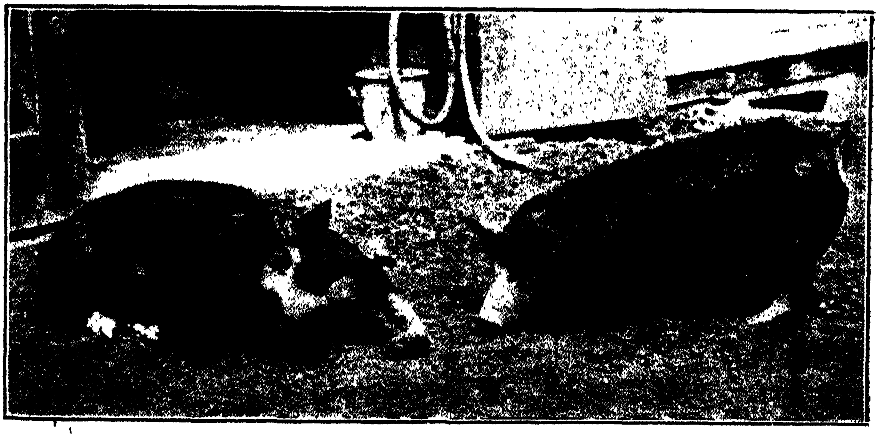


PLATE 176 (Fig. 6).

These pigs were raised at the Wisconsin Station (U.S.A.) on grain and grain by-products, without pasture or any other food. They became stunted, and finally developed the severe paralysis depicted. The proteins in such a ration are unbalanced in composition; there is a deficiency of mineral matter, especially calcium; and there may be a lack of vitamines. (From Hart, Wisconsin Station, in Henry and Morrison's "Feeds and Feeding.")

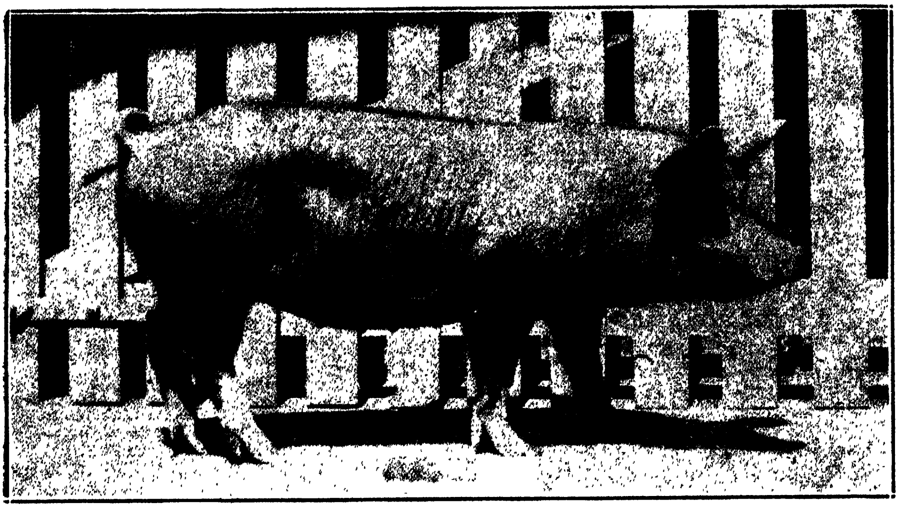


PLATE 177 (Fig. 7).

PLATE 178 (Fig. 8).

Figs. 7 and 8 are of farm sows of uncertain breeding too low in condition to prove satisfactory. The young sow in Fig. 7 is too low in condition to mate to the best advantage, while the sows shown in Fig. 8 are too low in condition to rear their young satisfactorily. Sows in such a condition frequently suffer for many months after farrowing, and even if they do not develop paralysis their progeny are more liable to disease and to abnormal troubles than the progeny of sows in medium breeding condition. Sows of the types illustrated should not be retained as breeders, as their breeding is doubtful and there are plenty of better type sows available at prices compartively low.

Fig. 9 is of a Poland-China sow too fat to prove satisfactory as a breeder. She is carrying far too much condition and would be liable to suffer from troubles such as heat apoplexy as well as paralysis. This photograph was taken a few days after this sow arrived from America some years ago. Her condition was in part due to the generosity of the passengers on the same steamer who were anxious that the pigs should arrive in the very best of condition. The sow proved a failure as a breeder largely as a result of this overfattening.

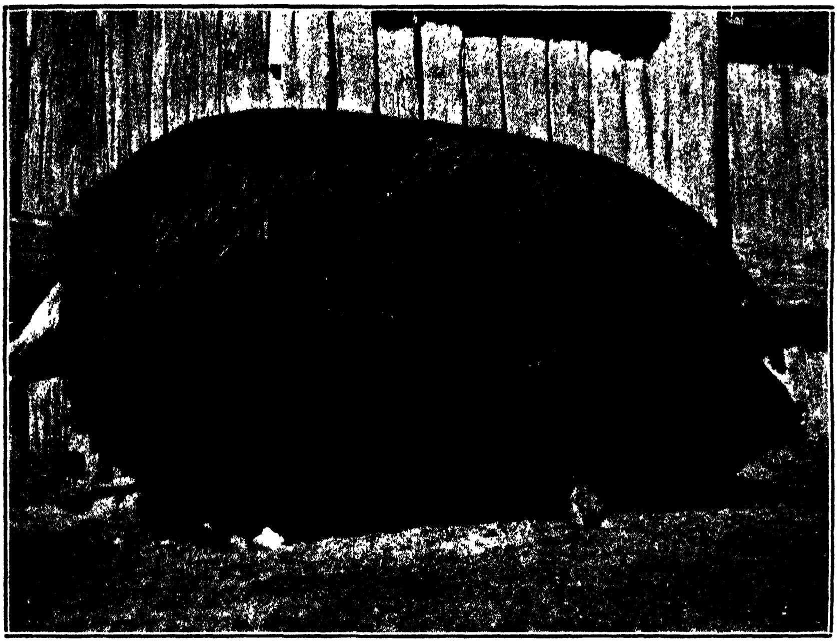


PLATE 179 (Fig. 9).

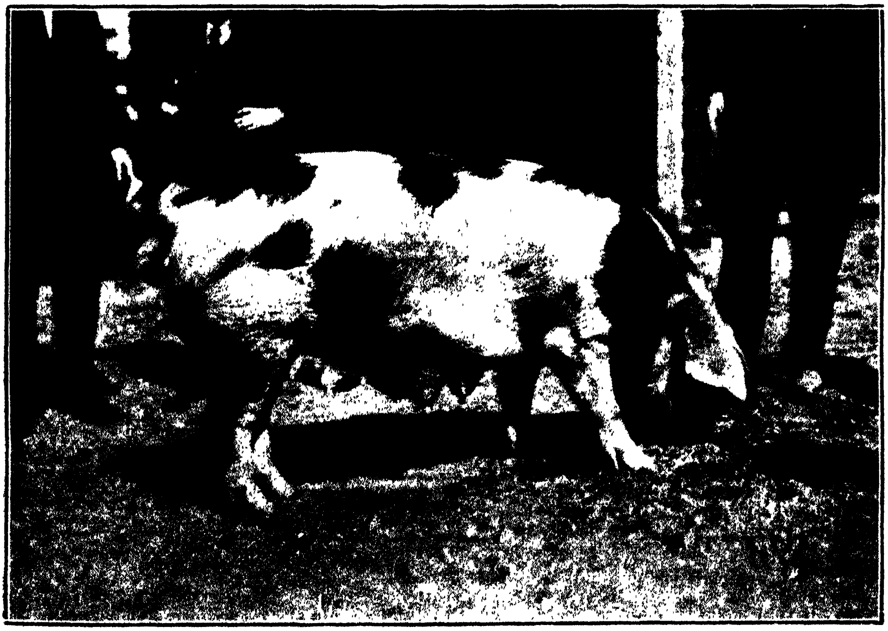


PLATE 180 (Fig. 10).

Fig. 10 is a prize-winning Gloucester Old Spot sow. This sow was rearing a large litter of active, vigorous pigs approaching weaning age. She is in ideal condition for a sow at this stage, for it is not to be expected that a sow will hold her condition whilst suckling. This emphasises the necessity of having the sow in proper condition prior to farrowing time in order that she may be able to do justice to her pigs.

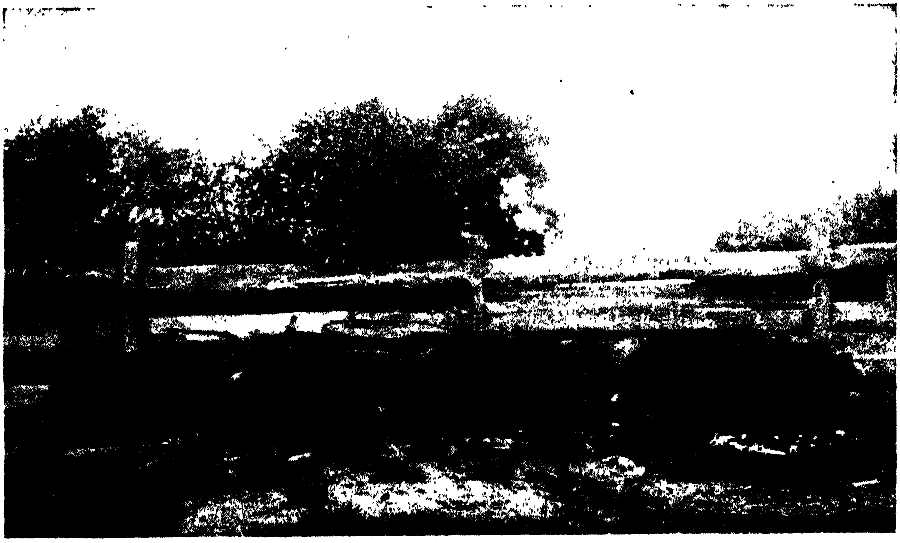


PLATE 181 (Fig. 11).—A GROUP OF SELECTED BERKSHIRE BROOD SOWS.
Sows of this description always realise good values in normal seasons, and are worth special care.

Fig. 11.—Berkshire sows in medium breeding condition, the condition conducive to satisfactory results. This is the ideal condition for in-pig sows, for they will farrow with little or no trouble and be able to rear their litters satisfactorily and without risk of going down in the hindquarters or suffering from other diseases.

TICK PARALYSIS IN PIGS.

A correspondent informed us recently that he had a well-grown, three-months-old sow that had become suddenly very ill; she went off feed and lay down. On rolling her over, the owner found a whitish coloured tick (known as a dog tick), and he sought information as to suitable treatment for an animal so affected.

Another correspondent advised: "I have recently purchased three first-class Middle York sows, three months old. They were in perfect condition when they arrived here, and have been well fed and cared for since, but two days ago I noticed that two of them were suffering from some ailment or other; they would not come up for their food, were very stiff and 'dopey,' and appeared to be getting worse. I am at a loss to know what is wrong or what to do . . ."

The following information was supplied:—The fact that the ailment suddenly manifested itself in the pigs suggests that it may be attributable either to bush-tick poisoning or to severe constipation. The common bush-tick fastens itself on the animal, usually about the head, ears, neck, or under the foreleg, and the poisonous effect of its bite causes a temporary paralysis of the hindquarters (particularly) and frequently severe constipation. These ticks (*Ixodes holocylus*) are comparatively common along the coastal districts of New South Wales and Queensland, and one species is found inland. They generally attack dogs, poultry, and pigs; but other animals are not by any means immune, nor even are human beings. After attaching itself to the animal the tick forces its feeding apparatus through the skin (it usually selects a thin-skinned portion of the body for its temporary abode) and commences to suck blood from the affected part. The tick gradually fills up, increases to two or three times its normal size, and at the same time apparently injects a certain amount of poison into the animal, the result being that the animal goes off its food, is disinclined to move from its bed, and when disturbed appears stiff, sickly, and paralysed, particularly in the hindquarters (later the forequarters may also be affected), breathing becomes laboured, and there may be a discharge from the nostrils; bowels are inactive and severe constipation follows; kidneys and bladder become inflamed and congested, and the urine is scanty and high coloured. If not attended to the animal gradually becomes worse, loses condition, and death occasionally results.

Careful search should be made for the ticks, and if found they should be cut off close to the skin with a sharp pair of scissors, or, better still, with a sharp razor. Do not attempt to pull the tick away. After cutting the tick off, rub the affected spot with antiseptic ointment, kerosene, or Stockholm tar.

Remove the pigs to a pen where they can be attended to regularly. Give each pig two tablespoonsful of castor oil in a half-cupful of warm milk as a drench immediately. About three hours after give each pig a mixture of one dessertspoonful of aromatic spirits of ammonia and ten drops of nux vomica (the chemist will make this up for you) in a small cupful of warm milk.

Compel the animals to take exercise; provide dry and warm, clean sleeping quarters, and treat the patients kindly for a few days. Give soft nourishing foods—milk, pollard, a bran mash, and similar foods.

Another remedy that has proved successful is as follows:—Give castor oil or olive oil as already advised, and an hour later give six drops of tincture of aconite each in a small quantity of warm water. Three hours later, if the patients have not recovered, give three drops of the same drug and repeat until four doses have been given; do not give more than four doses. Follow the instructions with regard to feeding and housing.

PRECAUTIONS AGAINST SWINE FEVER.

The most potent factor in the spread of swine fever among pigs is undoubtedly the infected pig, which may even pass on the disease to others several days before symptoms are exhibited, says Major C. G. Saunders, in an interesting article in the current issue of the "Pig Breeders' Annual." It must also be remembered that this infectiousness remains during the whole course of this disease. The virus of the disease is also spread through the medium of urine, fœces, eye and nasal discharges; and the floors, bedding, and manure in the pens or sties where infected pigs are housed become saturated with the virus which may be carried from one farm to another, or to different parts of the same farm on the feet of men and animals, or on the wheels of vehicles, and probably by birds. Stock attendants may also, by medium of their hands and any instruments or tools they may use, be the means of spreading the disease far and wide. The chief danger is, however, the infected pig, and attention is specially drawn to the fact that unthrifty pigs may have swine fever without showing any definite symptoms of the disease, and may be moved from one farm to another under the impression that they many only be suffering from some non-contagious disease. Another danger is the pig that has apparently recovered from the disease but is, in reality, suffering from it in a very chronic form, as such pigs may be infective to others for eighty days or longer. Carcases of pigs which have died from swine fever may retain the virus for months, and even cured meats are not always safe in this respect. Hence the necessity of boiling all offal and garbage before feeding to pigs.

The following precautions will reduce the danger of an outbreak of swine fever:—

(1) Quarantine all newly purchased stock and all pigs returned from show or market for three weeks in a remote section of the farm, and admit to the main herd only after careful scrutiny has revealed nothing suspicious.

(2) Locate pig yards and sties away from streams, highways, and keep strangers away from them, and especially pig dealers and persons who have unthrifty pigs upon their premises.

(3) Buy only from herds that are known to be healthy.

(4) Do not visit a farm where there are sick or unthrifty pigs.

(5) Cook all swill and offal before feeding, and make the man that has handled the raw material disinfect himself immediately after.

(6) After an outbreak of swine fever see that all carcasses are burned or buried deeply with quicklime.

It is well to remark here that in Australia stock regulations compel pig breeders to immediately report to the nearest stock inspector, police officer, or other Government official any suspected outbreak or serious trouble amongst pigs, and to carry out the instructions issued by these officers so that there will be no possible chance of disease spreading from herd to herd. Heavy penalties are imposed upon those who neglect or fail to carry out instructions issued under the Acts controlling these diseases, and the premises concerned may be quarantined for whatever period is deemed necessary. There is everything to gain and nothing to lose by reporting the matter immediately it is suspected there is anything seriously wrong with the pigs. The Departments of Agriculture in the various States will supply all information relative to these matters upon application free of cost. In any case it would be very unwise to introduce other pigs into such premises that were suspected of being infected until the matter was cleared up and only healthy stock remained on the property, and all buildings and stys, yards, paddocks thoroughly cleansed and freed of infection.—E. J. Shelton, H.D.A., Senior Instructor in Pig Raising, and approved by the Chief Inspector of Stock, Major A. H. Cory, M.R.C.V.S.

GESTATION CHART FOR BREEDING SOWS.

Jan.	Date of Farrowing.	Feb.	Date of Farrowing.	March.	Date of Farrowing.	April.	Date of Farrowing.	May.	Date of Farrowing.	June.	Date of Farrowing.	July.	Date of Farrowing.	Aug.	Date of Farrowing.	Sept.	Date of Farrowing.	Oct.	Date of Farrowing.	Nov.	Date of Farrowing.	Dec.	Date of Farrowing.
1	22 April	**1**	23 May	**1**	20 June	**1**	21 July	**1**	20 Aug.	**1**	20 Sept.	**1**	20 Oct.	**1**	20 Nov.	**1**	21 Dec.	**1**	20 Jan.	**1**	20 Feb.	**1**	22 Mar.
2	23 ,,	**2**	24 ,,	**2**	21 ,,	**2**	22 ,,	**2**	21 ,,	**2**	21 ,,	**2**	21 ,,	**2**	21 ,,	**2**	22 ,,	**2**	21 ,,	**2**	21 ,,	**2**	23 ,,
3	24 ,,	**3**	25 ,,	**3**	22 ,,	**3**	23 ,,	**3**	22 ,,	**3**	22 ,,	**3**	22 ,,	**3**	22 ,,	**3**	23 ,,	**3**	22 ,,	**3**	22 ,,	**3**	24 ,,
4	25 ,,	**4**	26 ,,	**4**	23 ,,	**4**	24 ,,	**4**	23 ,,	**4**	23 ,,	**4**	23 ,,	**4**	23 ,,	**4**	24 ,,	**4**	23 ,,	**4**	23 ,,	**4**	25 ,,
5	26 ,,	**5**	27 ,,	**5**	24 ,,	**5**	25 ,,	**5**	24 ,,	**5**	24 ,,	**5**	24 ,,	**5**	24 ,,	**5**	25 ,,	**5**	24 ,,	**5**	24 ,,	**5**	26 ,,
6	27 ,,	**6**	28 ,,	**6**	25 ,,	**6**	26 ,,	**6**	25 ,,	**6**	25 ,,	**6**	25 ,,	**6**	25 ,,	**6**	26 ,,	**6**	25 ,,	**6**	25 ,,	**6**	27 ,,
7	28 ,,	**7**	29 ,,	**7**	26 ,,	**7**	27 ,,	**7**	26 ,,	**7**	26 ,,	**7**	26 ,,	**7**	26 ,,	**7**	27 ,,	**7**	26 ,,	**7**	26 ,,	**7**	28 ,,
8	29 ,,	**8**	30 ,,	**8**	27 ,,	**8**	28 ,,	**8**	27 ,,	**8**	27 ,,	**8**	27 ,,	**8**	27 ,,	**8**	28 ,,	**8**	27 ,,	**8**	27 ,,	**8**	29 ,,
9	30 ,,	**9**	31 ,,	**9**	28 ,,	**9**	29 ,,	**9**	28 ,,	**9**	28 ,,	**9**	28 ,,	**9**	28 ,,	**9**	29 ,,	**9**	28 ,,	**9**	28 ,,	**9**	30 ,,
10	1 May	**10**	1 June	**10**	29 ,,	**10**	30 ,,	**10**	29 ,,	**10**	29 ,,	**10**	29 ,,	**10**	29 ,,	**10**	30 ,,	**10**	29 ,,	**10**	1 Mar.	**10**	31 ,,
11	2 ,,	**11**	2 ,,	**11**	30 ,,	**11**	31 ,,	**11**	30 ,,	**11**	30 ,,	**11**	30 ,,	**11**	30 ,,	**11**	31 ,,	**11**	30 ,,	**11**	2 ,,	**11**	1 April
12	3 ,,	**12**	3 ,,	**12**	1 July	**12**	1 Aug.	**12**	31 ,,	**12**	1 Oct.	**12**	31 ,,	**12**	1 Dec.	**12**	1 Jan.	**12**	31 ,,	**12**	3 ,,	**12**	2 ,,
13	4 ,,	**13**	4 ,,	**13**	2 ,,	**13**	2 ,,	**13**	1 Sept.	**13**	2 ,,	**13**	1 Nov.	**13**	2 ,,	**13**	2 ,,	**13**	1 Feb.	**13**	4 ,,	**13**	3 ,,
14	5 ,,	**14**	5 ,,	**14**	3 ,,	**14**	3 ,,	**14**	2 ,,	**14**	3 ,,	**14**	2 ,,	**14**	3 ,,	**14**	3 ,,	**14**	2 ,,	**14**	5 ,,	**14**	4 ,,
15	6 ,,	**15**	6 ,,	**15**	4 ,,	**15**	4 ,,	**15**	3 ,,	**15**	4 ,,	**15**	3 ,,	**15**	4 ,,	**15**	4 ,,	**15**	3 ,,	**15**	6 ,,	**15**	5 ,,
16	7 ,,	**16**	7 ,,	**16**	5 ,,	**16**	5 ,,	**16**	4 ,,	**16**	5 ,,	**16**	4 ,,	**16**	5 ,,	**16**	5 ,,	**16**	4 ,,	**16**	7 ,,	**16**	6 ,,
17	8 ,,	**17**	8 ,,	**17**	6 ,,	**17**	6 ,,	**17**	5 ,,	**17**	6 ,,	**17**	5 ,,	**17**	6 ,,	**17**	6 ,,	**17**	5 ,,	**17**	8 ,,	**17**	7 ,,
18	9 ,,	**18**	9 ,,	**18**	7 ,,	**18**	7 ,,	**18**	6 ,,	**18**	7 ,,	**18**	6 ,,	**18**	7 ,,	**18**	7 ,,	**18**	6 ,,	**18**	9 ,,	**18**	8 ,,
19	10 ,,	**19**	10 ,,	**19**	8 ,,	**19**	8 ,,	**19**	7 ,,	**19**	8 ,,	**19**	7 ,,	**19**	8 ,,	**19**	8 ,,	**19**	7 ,,	**19**	10 ,,	**19**	9 ,,
20	11 ,,	**20**	11 ,,	**20**	9 ,,	**20**	9 ,,	**20**	8 ,,	**20**	9 ,,	**20**	8 ,,	**20**	9 ,,	**20**	9 ,,	**20**	8 ,,	**20**	11 ,,	**20**	10 ,,
21	12 ,,	**21**	12 ,,	**21**	10 ,,	**21**	10 ,,	**21**	9 ,,	**21**	10 ,,	**21**	9 ,,	**21**	10 ,,	**21**	10 ,,	**21**	9 ,,	**21**	12 ,,	**21**	11 ,,
22	13 ,,	**22**	13 ,,	**22**	11 ,,	**22**	11 ,,	**22**	10 ,,	**22**	11 ,,	**22**	10 ,,	**22**	11 ,,	**22**	11 ,,	**22**	10 ,,	**22**	13 ,,	**22**	12 ,,
23	14 ,,	**23**	14 ,,	**23**	12 ,,	**23**	12 ,,	**23**	11 ,,	**23**	12 ,,	**23**	11 ,,	**23**	12 ,,	**23**	12 ,,	**23**	11 ,,	**23**	14 ,,	**23**	13 ,,
24	15 ,,	**24**	15 ,,	**24**	13 ,,	**24**	13 ,,	**24**	12 ,,	**24**	13 ,,	**24**	12 ,,	**24**	13 ,,	**24**	13 ,,	**24**	12 ,,	**24**	15 ,,	**24**	14 ,,
25	16 ,,	**25**	16 ,,	**25**	14 ,,	**25**	14 ,,	**25**	13 ,,	**25**	14 ,,	**25**	13 ,,	**25**	14 ,,	**25**	14 ,,	**25**	13 ,,	**25**	16 ,,	**25**	15 ,,
26	17 ,,	**26**	17 ,,	**26**	15 ,,	**26**	15 ,,	**26**	14 ,,	**26**	15 ,,	**26**	14 ,,	**26**	15 ,,	**26**	15 ,,	**26**	14 ,,	**26**	17 ,,	**26**	16 ,,
27	18 ,,	**27**	18 ,,	**27**	16 ,,	**27**	16 ,,	**27**	15 ,,	**27**	16 ,,	**27**	15 ,,	**27**	16 ,,	**27**	16 ,,	**27**	15 ,,	**27**	18 ,,	**27**	17 ,,
28	19 ,,	**28**	19 ,,	**28**	17 ,,	**28**	17 ,,	**28**	16 ,,	**28**	17 ,,	**28**	16 ,,	**28**	17 ,,	**28**	17 ,,	**28**	16 ,,	**28**	19 ,,	**28**	18 ,,
29	20 ,,	—	—	**29**	18 ,,	**29**	18 ,,	**29**	17 ,,	**29**	18 ,,	**29**	17 ,,	**29**	18 ,,	**29**	18 ,,	**29**	17 ,,	**29**	20 ,,	**29**	19 ,,
30	21 ,,	—	—	**30**	19 ,,	**30**	19 ,,	**30**	18 ,,	**30**	19 ,,	**30**	18 ,,	**30**	19 ,,	**30**	19 ,,	**30**	18 ,,	**30**	21 ,,	**30**	20 ,,
31	22 ,,	—	—	**31**	20 ,,	—	—	**31**	19 ,,	—	—	**31**	19 ,,	**31**	20 ,,	—	—	**31**	19 ,,	**31**	22 ,,	**31**	21 ,,

NOTE.—Black figures in above table indicate date of service.

This chart presents in an instructive form figures relating to the gestation period of brood sows. For example, a sow mated to the boar on 1st January is due to farrow on 22nd April; a sow mated on 1st July is due on 20th October. The chart should be preserved for future reference by breeders of all classes of pigs. The normal period of gestation, *i.e.*, the period from the time of conception to the birth of the young pigs, is 112 days, this period is sometimes remembered as roughly three months three weeks three days, or 16 weeks. With very young sows the period is sometimes of shorter duration, and instances are on record where young sows have farrowed at from 100 to 108 days after becoming pregnant; on the other hand, old sows in abnormal condition have been known to carry their young for more than 140 days.—E. J. SHELTON, H.D.A., Senior Instructor in Pig Raising.

DISEASES IN PLANTS.

NEW LEGISLATION.

A Bill to consolidate and amend the law relating to diseases in plants and for other purposes was introduced in the Legislative Assembly by the Minister of Agriculture and Stock, Hon. Harry F. Walker, in the course of the month. Subjoined is an abridged report of Mr. Walker's second-reading speech taken from Hansard.—ED.

MINISTER'S SECOND READING SPEECH.

The SECRETARY FOR AGRICULTURE (Hon. H. F. Walker, *Cooroora*): At the previous stage I gave hon. members a few details regarding the contents of this measure in order that they should have some idea of its provisions. At this stage I can add much to my remarks, and also give some idea of what the alterations consist of with a view to helping them in the passage of the Bill through Committee. The existing Acts were certainly of some use for a considerable time, and have certainly served their purpose; but, as time goes on, amendments must naturally be required to bring the legislation up to date and to deal with the particular industries affected. That is the reason why we have decided to consolidate the Diseases in Plants Acts, 1916-1924 and the Diseases in Plants Act of 1929, to which I referred in Committee, and incorporate them in this Bill. The original Act was passed in 1896, an amendment in 1916, and another amendment in 1924.

A Necessary Measure.

The Bill covers the introduction into Queensland of any tree, plant, or vegetable which is likely to introduce any insect, fungus, or disease, and controls the removal of trees, plants, or vegetables from nurseries, orchards, and gardens within the State. In other words, the Bill seeks to control all plant life in Queensland. It is particularly far-reaching, but is necessary in the light of experiences during recent years, when it has been found most difficult to locate and control the spread of disease by reason of the minute character of the bacteria or aphides concerned, which makes it particularly essential that control should be exercised to cope with these diseases. In recent years scientific investigation has been particularly active in trying to combat these diseases, especially those affecting one of our most important industries—the banana industry, upon which I need not enlarge at the present moment, seeing that another Bill before this Chamber will give hon. members an opportunity of considering that industry.

We are all seized with the importance of production, and of the necessity of preventing the huge economic loss which occurs yearly from disease in crops, &c. That is a loss not only to those engaged in the particular industries but to the State generally. During the last few months—and no doubt the Leader of the Opposition experienced the same position during his term as Secretary for Agriculture—many deputations have approached me drawing attention to the fact that something must be done in the direction I have indicated; and the wide nature of the Bill now under discussion proves conclusively that such a measure has been needed for some considerable time.

This Bill is a consolidation of two other Acts, combined with the experience gained from recent investigations. It also adopts to a certain extent the experience of other States of the Commonwealth, particularly South Australia, proving conclusively that we must go ahead if we are to get into line with the action that is being taken in other States to deal with the ravages of plant diseases.

Mr. W. Forgan Smith: You will find that your Bill is a good deal ahead of similar Acts in other States.

The SECRETARY FOR AGRICULTURE: The departmental experts inform me that this Bill incorporates many provisions contained in the legislation of Southern States, more particularly South Australia. It is mainly a Bill that has been initiated and worked up by the experts of the department, because, although I naturally [illegible] a little to do with it, the major portion of the Bill is the work of the departmental officers. It may be thought that the Bill is too drastic; but breadth of vision is required when dealing with the conditions of plant life in a State like Queensland, with its enormous area and its climates varying from the comparative cold of the Stanthorpe district to the tropical heat of the North.

PLATE 182.—DENSE PEAR ON A WESTERN ROAD.

Prickly-pear on the Morven-Charleville stock route, showing the density of infestation prior to the operations of the Prickly-pear Commission, which have definitely checked the further encroachment of the pear in Queensland.

PLATE 183.

Pear on a South-Western holding fourteen days after being sprayed.

Wise Exercise of Authority.

Most of those districts grow fruit of some description or other, which is more subject to disease than ordinary plant life. We are asking for great powers under this Bill, but so long as the administration is sympathetic no harm can be done. All Bills, no matter how hard or how soft they may be, can easily be spoiled by unsympathetic administration.

Mr. W. Forgan Smith: It all depends on the wise exercise of authority.

The SECRETARY FOR AGRICULTURE: Exactly. This Bill can be spoiled if it is not handled sympathetically. Knowing the menace gathering around us to-day due to the fact that we have not sufficient power under present Acts to deal with many plant problems quickly and effectively, anyone occupying the chair I have the pleasure to occupy to-day must realise his responsibility in respect of the plant life of Queensland.

I venture to say that, if the danger of "bunchy-top" had been realised a few years ago, legislation of this character would have been brought in, and we would never have seen the disease as far North as it is found to be to-day. When I inform hon. members that "bunchy-top" has spread from the Tweed River to a little north of Buderim, it will show them how the disease is spreading; and we hope, with the assistance of a measure such as this and with the help of scientists, to control "bunchy-top" effectively. If not, we shall hold it back until scientists get to work so that it will not be allowed to spread to the beautiful country on the Tully River in North Queensland. . . . . In the Bill which I shall presently introduce provision is made for that matter to be handed over to a board consisting of two growers' representatives and two Government representatives, who will deal with it in whatever form they think fit, subject to departmental control.

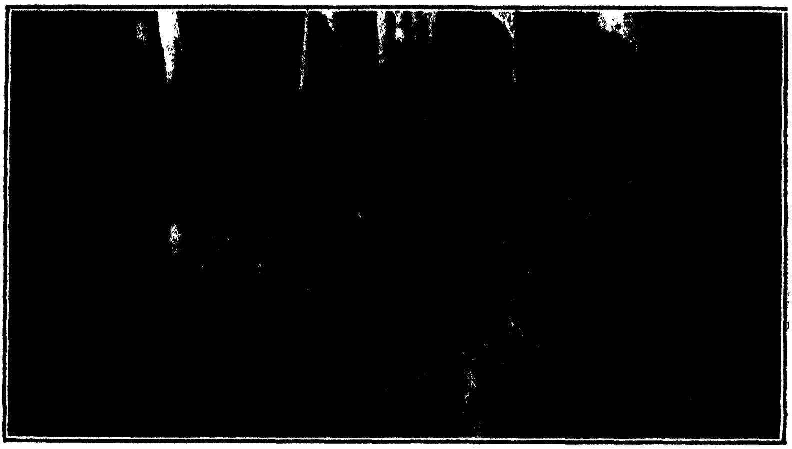
The Insect Menace.

In recent years mankind has realised just how much our material welfare depends on successfully combating the various insect pests, fungus growths, and other diseases attacking economic plants on which we are so largely dependent for our food supplies. Competent observers believe that it is no exaggeration to say that the future will witness a severe struggle between man and insect for the world's available food supply. We have to be up and doing. We have to work hard and avoid unnecessary delay. We have to follow the lines we would like to follow if we owned Queensland individually. If Queensland was our private property, we would not wait for someone in some other part of the world to move when there was any danger ahead. We would immediately be up and doing, and that is what we want to do to-day with regard to things which are a menace to the food supply of the people of Queensland. Our first line of defence against new pests and diseases is the new Federal quarantine law and the vigilance that is being exercised to prevent further pests from gaining access to Australia. Of course, we are backed up in that direction by having a long sea boundary around us which ensures remoteness from other countries.

I venture to say that no disease can come here by air and become a menace to Queensland—it would die a natural death on the way—but we have pests inside our shores which have to be combated. In Queensland, for instance, our efforts so far have not been a complete success. We are still faced with many serious troubles within our gates. We have had an enormous number of pests introduced here, and I should not be surprised if 90 per cent. of the pests found here at the present time have been introduced in some form or another from other countries; but it is very hard to detect on the unloading from a ship of certain vegetable foods or grain, cotton seed, or anything of that description, anything that may be a disease, or that could be liberated in many cases without being detected by the departmental officers, who are particularly alive to the interests of Queensland in the discharge of their duties. That will give some idea of the serious nature of the question and how hard it is to keep such diseases within reasonable bounds in Queensland and other parts of Australia. . . .

Plant Disease and Its Economic Effects.

Dealing with the Darling Downs wheat crop, for instance, we all know how fine a crop we shall have this season, due to the very good rains. It would be a deplorable loss if any disease reduced the yield to a couple of million bushels—about half the anticipated crop this year. There are at the present time a great many other diseases that affect that crop. For instance, flag smut last year and up to the present time has been responsible for an enormous loss. Then there have been losses from other pests. In combating diseases we have to take into consideration in regard to the farmer that there are serious losses from other causes than the uncertainty of seasons. The farmer has to combat danger from marsupials; and Queensland farms seem to have more marsupials to contend with than any other country I know of.



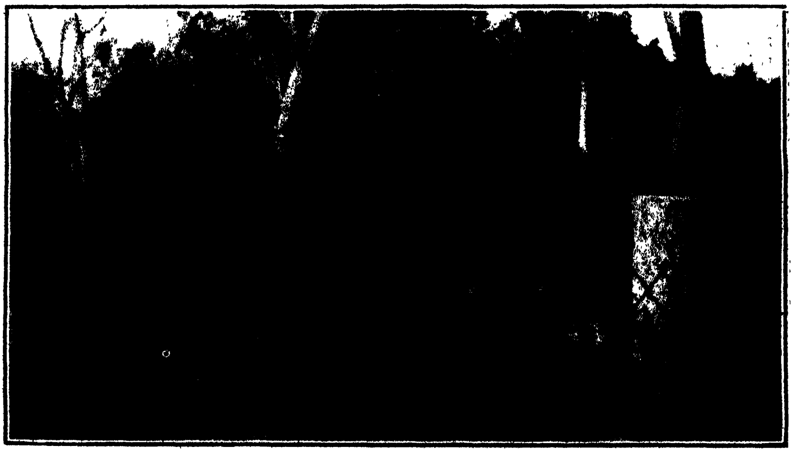


PLATE 184.—WHAT A PROGRESSIVE FARMER HAS DONE IN THE GAYNDAH DISTRICT.

Two views, showing heavy pear infestation on virgin land, on portion 47, parish of Wetheron, when selected by Mr. W. Benham. (See illustrations on the next page.)

Then the cotton crop is of vast importance in Queensland; and we are hoping that it will be more free in the future from pests than previously, as in the past various diseases have caused no end of trouble in connection with that crop. When cotton was introduced here and the question of ratooning came up, it was a debatable question whether the boll-weevil, commonly call the corn-ear worm, which attacks similar plants, backed up by many other weevils, was responsible for enormous loss, and in some parts of the world would not practically annihilate the industry here. Through the care of the farmers in Queensland we are now producing cotton almost free from the diseases which affect many other countries. When cotton was produced in the Lockyer district the boll-weevil almost wiped it out. Fortunately the people there were able to switch on to some other industry, such as maizegrowing and dairy farming, and so did not feel the loss as severely as the settlers in the drier Burnett and Rockhampton districts, where farmers cannot go in for the other crops which I have mentioned. We all know that the value to the State of the maize crop, particularly on the Atherton Tableland, is very great; and we can imagine the effect of pests similar to the boll-weevil in cotton attacking that crop. They have at present to combat top rot, which has caused enormous loss. I venture to say that, if we could successfully fight this pest, it would add 20 per cent. to the value of the crop to the grower, and I am confident that the consumer also would get the benefit to a great extent.

PLATE 185.

The same land on Mr. Benham's well-managed farm to-day, illustrating what can be done by practical methods of pear destruction and land settlement.

Then we come to the banana-growing industry. Here we have the borer. We all know what that is. It has travelled from the South, and is now right up North. It brings about a general weakening of plant life. Then there is "bunchy-top," which appeared in the industry some seven or eight years ago, and has spread over the whole of the Southern district. We have been conducting experiments, but, generally speaking, we can look upon the beetle borer as the principal menace to the banana-growing industry.

Mr. W. Forgan Smith: Have you heard how the parasites from Java are getting on?

The SECRETARY FOR AGRICULTURE: Unfortunately, we cannot yet prove that they will be effective; still, there is hope in that quarter. We must not interfere with the eggs of the insect until the experiments are complete for fear that we destroy the work that the entomologists have already done. It is the scientist on whom we must rely. It is unreasonable to expect the farmer to do these things. In the first place, it is too expensive, and the experiments are too complicated, and in any case he has not the time to devote to the work.

Another disease which affects banana is leaf spot, which is taking a heavy toll of the industry to-day. Perhaps it is a greater menace than the beetle or "bunchy-top," owing to the fact that it closes up the pores of the plant and strangles it. We have authorised the employment of a pathologist to try to cope with this disease, or, at any rate, to check it. Hon. members will see that these three combined must present an enormous menace to one of the finest industries we have, and one which is the most calculated to assist closer settlement. When you remember that at the present time the people of Australia eat only about half the bananas that the people of America eat, you appreciate what a tremendous future the industry could have if we can only save it from the ravages of pests.

Then, in regard to citrus fruits, we have the bronze orange bug, the spiny bug, and many scale and other diseases. A list of them shows the heavy losses the citrus-growers must be suffering to-day.

Then we come to the apple-grower, who is situated in an entirely different part of Queensland. That fact reminds hon. members that we require a measure that will enable us to impose the necessary drastic restrictions to protect the apple-grower in the South as well as the banana-grower in the North. In the apple districts we have to cope with the codlin moth and the fruit fly, and this Bill provides for protection from those pests in the hope that better results may be achieved and the present losses minimised.

The pineapple-grower does not escape. He is worried with what they call water blister, which is causing enormous losses. Fortunately, the price has been such lately that the pineapple-grower has been able to stand a little loss. Our aim and object, however, is to grow bananas, pineapples, and all plants without loss from disease at all.

Then we have the diseases which attack crops like the tomato and the potato. There has been some controversy lately as to whether the tomato is a vegetable or a fruit; but, whichever it is, it is very nice to eat. There are diseases which cause enormous losses in connection with both these crops.

Then we come to sugar-cane. I venture to say that hon. members who represent sugar-growing districts may be surprised to know that on looking over the particulars given me by experts I find that sugar-cane suffers from more diseases than any other crop we produce. The department has done wonderful work in trying to combat these diseases. Of course, the organisation of the sugar-growers themselves is entitled to a certain amount of credit for what has been done; but, apart from that organisation—which is a credit to the State—the Government have also done something to combat the borer and other diseases which attack cane.

Roughly speaking, that pest has caused a loss of £120,000 per annum. That is an enormous loss, and will give some indication as to why it is necessary that a Bill of such a drastic nature as this should be introduced. An enormous number of pests and a large number of industries will be controlled by the one measure, and that is the reason why this Bill appears to be of a drastic character to a certain extent. An additional feature in connection with the Bureau of Sugar Experiment Stations has recently been brought into being by the appointment of a sugar-cane pathologist to provide the cane farmer with information as to how to combat diseases and clean up the farm.

PLATE 186.—THE PEAR-POISONERS' WORK.

Poisoning is less arduous than burning, and the plants are killed where they grow, instead of being moved, and thus increasing the risk of reinfestation from dropped leaves and fruit.

PLATE 187.—POISONED PEAR ON VIRGIN COUNTRY.

The work of the Prickly-pear Commission well illustrated.

A Public Duty.

I think it is just as well now to leave the question of diseases and to remind hon. members that it is the duty not only of hon. members but also of those engaged in farming industries—particularly those who take a prominent part in various agricultural organisations—to try to enlighten the farmer on the subject of combating many of the diseases, and to achieve that end through the organisation and by means of literature circulated from time to time. If that were done, it would mean an enormous advantage to those concerned, and be of considerable assistance to the department. Roughly speaking, the estimated loss in primary production due to pests and diseases ranges from 5 per cent. to 20 per cent. and even 25 per cent. on crops produced in Queensland to-day, showing that when the Bill is passed and becomes subject to sympathetic administration it will effect an enormous saving in the loss that now occurs. That loss clearly indicates the urgency of taking drastic action. That factor is recognised, not so much from the point of view of increased entomological and pathological investigation but from the point of view of the legislation necessary for the enforcement of measures designed to combat the different pests and diseases.

As I have already stated, the original Act was passed in 1916. It was amended in 1924, when provision was made for the constitution of a board of advice. There is no doubt that at that particular time the board of advice, which consisted of the heads of the various branches of the department, had the advantage of the services of particularly able men. . . . We are superseding that board by a board of experts controlled by the department—a board that will be in touch with the incidence of plant disease all over Queensland, and will report direct to the Minister. The board of advice has been out of existence for some considerable time, and we do not intend to reconstitute it. The Bill will serve the dual purpose to which I have already referred. It provides for the examination of all plants, fruit, and vegetables entering the State, and provides for the imposition of a charge for the necessary examination. That will be given effect to by regulation. It is not proposed in any shape or form to tax the small man who has a home in Brisbane or any other town in Queensland. We want him to go on in his usual thrifty way growing vegetables and plants of other descriptions to reduce household expenditure or for experimental purposes, but in other cases it is intended to exercise control. We cannot allow "bunchy-top" in a man's back yard on one or two banana plants, thereby becoming a source of danger to surrounding farms. It is our object to prevent the spread of "bunchy-top" leaf spot, and other diseases from spreading to adjacent farms and then operating at large very much to the detriment of our State.

I have already referred to the fact that it is the intention to examine all plants, fruit, and vegetables entering from other States, and I think I should point out that the other States of the Commonwealth have passed similar legislation, thereby demonstrating the wisdom of introducing this legislation. The Diseases in Plants Act has been responsible for protecting Queensland from the invasion of many diseases up to the present time.

Administration of the Measure.

For evident reasons work has been carried out in the past in respect of plants, fruits, &c., coming into Queensland from other States; but this Bill will give power to cover the whole lot. Naturally, finance comes into this Bill to a great extent, because to carry out all the things the Bill provides for, in addition to the powers it confers, a regular army of inspectors would be required in the industries to which I have referred; but, by the incorporation of the other Bill, which I have said is supplementary to this Bill, there will be an enormous saving effected to the banana industry. The men now loading bananas and carrying out inspectorial work will be used for a dual purpose. This will effect an enormous saving, and provide the department with greater control over them. Naturally, the work they do will be reflected in a good deal of saving of time to the department. Freer action to work is necessary; and, when a report is received from a field inspector in regard to a particular disease, and it also covers anything suspected of being a disease, prompt action will be taken. That may seem drastic, but action in such a case is necessary and warranted. We want disease reported as quickly as possible with a view to combating it, or to keeping it in check for the moment with a view to combating it ultimately. Any disease affecting trees, plants, fruits, or vegetables caused by an insect, fungus, or any other disease is to be dealt with promptly. The present Bill has the support of all our organisations. As a matter of fact, they have asked for it knowing full well that we have not the power under the present Act to control disease effectively.

The definition of ''abandoned or neglected orchard or nursery'' is a new idea, and is one which requires a little thought before criticism is made with respect to it. We have had an enormous amount of trouble up to the present in connection with abandoned orchards. Only last week I gave instructions for several orchards to be cleaned up because the department was not able to locate the owners. Several orchards were abandoned and reverted to the Crown. We had them cleaned up, knowing the menace they were to the industry, and knowing that they were right on the border-line. An abandoned orchard may not be affected by disease at the time of its abandonment; but it is likely to create disease on account of the heavy weed growth which comes up all over it in consequence of its abandonment. It is then a greater menace than an orchard affected with ''bunchy-top,'' which can be immediately dealt with. This Bill provides that, after a period of six months, on an inspector proving an orchard to be an abandoned orchard, the department shall have power to enter upon and remove the trees growing therein. If there is no owner of a neglected orchard, we have to find out whether the orchard has reverted to the Crown. If it has not, then the owner pays pound for pound in connection with the expense of cleaning it up.

The Bill further provides that the owner of a banana orchard must keep his orchard clean for a distance of 1 yard around each stool. Naturally, the number of plants in the stool increases. Sometimes an owner grows four or more in a stool; but it has been proved that the growth of three plants in a stool is the best method. That enables a man to get into his orchard after heavy rain and to clean up for a yard around each stool, and later to take out the weed growth. The object of this clause is to give him a chance to keep his plants clean, and, naturally, if he keeps his plants clean, as good farmers generally do, disease is obviated. We find that power absolutely necessary. Power of appeal is provided for in certain cases where action is taken to deal with abandoned orchards. This is a new departure, but I understand that it was considered in 1925 and 1926. When this Bill is passed, if an owner has a grievance, he has the right of appeal without going to law. It is a cheap method of getting over the whole trouble, and one which, in my opinion, will have the desired effect of giving a man satisfaction, and at the same time enable the department to clean up the whole of the affected area.

The definition of ''disease'' has been widened by adding a provision which will enable an inspector to deal with suspiciously dangerous symptoms, which he may not at the moment be able to diagnose definitely. For instance, where a plant shows symptoms which, in the opinion of an expert, look like a disease, the inspector can immediately quarantine that plant. The object is not to allow something to get hold which may later on prove a menace. The vegetable pathologists attached to the sugar branch of the department specially asked for this provision; and a recommendation from such an authoritative source cannot be ignored.

The definition of ''occupier'' will now be ''the person in actual residential occupation of any land.'' The old definition of ''occupier'' was ''a person in actual occupation of any land, or, if there is no such person, then the person entitled to possession thereof.'' That caused a considerable amount of trouble, but under the new definition, if a lessee has abandoned a property, the department will be in a position to approach the owner at once.

There is another clause in the Bill which provides that the cost incurred in cleaning a plantation shall remain a first charge on the land.

The registration of orchards is also provided for. A fee for registration may be charged—that will be done by regulation—but it will be a nominal one.

Under the Bill which I propose to introduce later this afternoon in connection with the banana industry, provision is also made for inspectors to report first to the board and then to the department in connection with the issue of permits for planting new areas. We propose that the board shall constitute a board of appeal to see if the inspectors have done their work wisely and judiciously. It will be seen that the Bill now under consideration enables fresh planting to be controlled, even when a grower uses plants grown on his own property.

Provision is made to prohibit the introduction of any insect or fungus except with the consent of the Minister. Naturally the matter will be decided by the expert to whom it is referred.

Failure to gather and destroy fallen fruit is now made a specific offence. That has caused enormous trouble, more particularly in the citrus fruits districts. It is made obligatory on the part of the owner to clean up his orchard. Power is given to inspectors to clean up a place and recover the cost.

Provision for Compensation.

There is also provision for the payment of compensation where healthy plants are destroyed to prevent the spread of disease. For example, we may want a quarantine area, and it may happen that healthy plants are destroyed in that area. It is proposed that compensation shall be given in respect of those healthy plants.

PLATE 188.—THE ATOMISER AT WORK.

The supply of cheap and effective poisons for the destruction of prickly-pear and apparatus for their application has made it possible to control infestation on clearable land. In this way a greater area can be effectively cleared in a given time at a far cheaper rate.

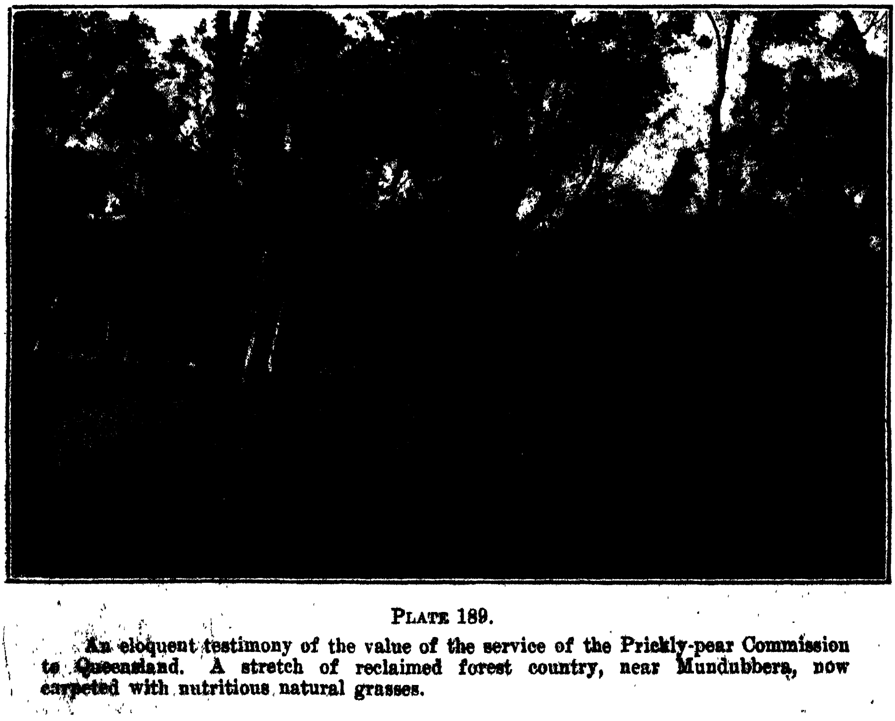


PLATE 189.

An eloquent testimony of the value of the service of the Prickly-pear Commission to Queensland. A stretch of reclaimed forest country, near Mundubbera, now carpeted with nutritious natural grasses.

Similarly, if we should decide to proclaim an area, say, from Eumundi to the Burnett watershed to keep back "bunchy-top," we would have to compensate the owners of clean banana orchards in that district.

Fighting plant diseases is considered to be one of the most important functions of Departments of Agriculture in every part of the world. Many highly-trained specialists are maintained; legislation, often of a very drastic nature, is enacted; and large sums of money are spent for this purpose, as it is universally recognised that profitable returns cannot be obtained unless plant diseases are constantly and systematically fought. The Bill, if passed, should have the effect of materially reducing the loss that is being annually sustained by our primary producers as the result of the damage caused by plant pests.

SOILS IN THE NORTH-WEST.

ON THE OPEN ROLLING DOWNS.

Leaving Townsville by car on the 14th September, Mr. N. A. R. Pollock, Northern Instructor in Agriculture, accompanied by Professor Prescott of the Waite Institute, Adelaide, Mr. Hines of the Brisbane University, and Mr. Winks of this Department, who were desirous of making an inspection of the principal soil types of the North, entered on an interesting tour of duty.

The profiles of soils from desert sandstone at Sellheim, the black and red soils from granite at Charters Towers, the recent alluvials at Balfe's Creek and elsewhere on the road to Pentland, desert sandstone soils near Torrens Creek, typical black soils between Torrens Creek and Jardine Valley, the downs soil both brown and chestnut from Hughenden to Winton via Richmond, and a further example of the desert sandstone soil at Colane near Winton, were all examined on the outward journey.

Professor Prescott expressed himself as well pleased with the result of his inspections and stated that the soil of the rolling downs country was comparable with the black soil regions of Russia and the prairies of America. He was emphatic in agreeing with the opinion so frequently stressed by Mr. Pollock that the growth and conservation of members of the Sorghum family for fodder, either as grain, hay, or ensilage, in the rolling downs regions were not only practicable, but necessary to provide for periods of shortage, and stated that under similar rainfall and climatic conditions in the Sudan, where he had been stationed for a number of years, the cultivation of Sorghums largely for grain was the chief industry.

Professor Prescott and party remained at Winton and left later for Longreach. Mr. Pollock went on to Kynuna, Mackinlay, Gilliat, and other centres to Richmond, and then back to Townsville.

During his travels the unequal distribution of the rainfall last season was evident in well-grassed areas contiguous to others on which there was little or no feed, this alternation being noticeable in all the districts passed through.

Graziers who had not been favoured with sufficient rain had experienced no difficulty in securing agistment for their sheep at no great distance from their holdings on country that was lightly stocked as a result of flock depletion in recent dry years. All sheep noticed were in excellent condition, while the pasturage was calculated as sufficient to last until the rains of the wet season commence.

Interest in the growth and conservation of fodder, he found, has increased rather than diminished, while the use of phosphate licks is becoming general.

At Colane, near Winton, Sudan grass germinating after a fall of rain in April had given excellent results, being cut for hay and grazed by sheep during several months. At the time of his visit, though most of the Sudan had died several clumps were showing a growth of up to a foot in height, despite the fact that no rain had fallen since April.

At "Colwell," near Mackinlay, Mr. Desmond Collings had made experimentally a small quantity of silage from summer grasses cut in the channel country. Though a good deal of waste occurred by reason of the unchaffed material not being compacted in the small pit provided, the centre was excellent and greatly relished by the house cow to which it was being fed.

Arrangements have been made to supply seed for trials with Mr. J. M. Chisholm, Wantalayna, Winton; Mr. E. P. Phillott, Colane, Winton; Messrs. Collings and Wells, Colwell, Mackinlay; and Mr. C. Morell, Lonsdale, Richmond. Mr. Morell expects to have somewhere about 80 acres under crop, when, if a normal season is experienced, a satisfactory demonstration of fodder growth and conservation should be obtained.

COMMONWEALTH SOIL RESEARCH.

ADDRESS BY PROFESSOR J. A. PRESCOTT.

PROFESSOR PRESCOTT, Chief of Division of Soil Research, Council for Scientific and Industrial Research, addressed a gathering of officers of the Departments of Agriculture and Stock, Public Lands, and the Provisional Forestry Board in the Land Court Room, Brisbane, on 8th October. The Minister for Agriculture and Stock (Hon. H. F. Walker) presided.

The Story of Soil Research.

Professor Prescott said that the purpose of his meeting those present was to enable him to express some of his general impressions, and to tell something of the story of Commonwealth soil research. Some of them might perhaps be interested to learn something of the origin of the Commonwealth soil work.

The Waite Institute of the University of Adelaide was barely five years old and was founded as a result of a donation of £100,000 to the University of Adelaide by Mr. Peter Waite, a South Australian pastoralist. Mr. Waite intimated to the University that it was to help his brother farmers that he had donated that large sum. Among the problems which the University of Adelaide had set itself to solve were those relating to crop production primarily, and soil problems as one of its branches. Soil problems, of course, interested them primarily from the agricultural point of view, but they were beginning to realise the importance of research work in connection with pastoral soil problems, in the study of which Mr. Brünnich (Queensland Agricultural Chemist) had led the way, especially in relation to animal nutrition.

Southern Investigations.

The Commonwealth Council for Scientific and Industrial Research some two years ago found itself in the position of being responsible for two experimental stations, both in the irrigation areas, in which soil problems were of extremely great importance. On the irrigation areas of the Murray and Murrumbidgee were a number of soldier settlers, many of whom were struggling to make a living, and before any advice could be given to those men as to the fertilisers to be used, it could be seen that a soil survey would have to be taken so as to get a complete understanding of local soil types. They set to work at Renmark, in South Australia, where on the irrigation area there were about 4,000 acres occupied by returned men producing dried fruits under very adverse conditions. The difficulty, of course, was to find a suitable man to carry out that work. There was only one man in the whole of Australia who had had any experience at all in soil survey work, and that was Mr. Taylor. He had been sent to the United States of America by the New South Wales Government to study soil survey methods, and they were fortunate enough to secure his services from the New South Wales Department of Agriculture. This work indicated to them that there was a very close relationship between the productivity of the soil and the actual soil type as defined by the survey.

The next area they investigated was that of Wimmera, in Victoria, where there was a settlement of returned men on reasonably good land. It was found that there were something like five different soil types in an area of 2,000 acres, and the difficulty there was that the Irrigation Commission was supplying the same quantity of water to all the men, and it was necessary to get some understanding of the soil types so that this service might be beneficial.

The third area they investigated was the Lower Murray swamps. They had been reclaimed, some of them fifty years ago, and others since the war, and they presented an entirely new soil type in South Australia, if not in Australia as a whole. Lucerne was the main crop grown, but there was a tendency for the dairy farmers to rely on perennial pasture. As a result of their survey they could almost definitely state that this inclination for the practical farmer to drop lucerne and go in for permanent pasture had a sound scientific basis. The soil was not a lucerne soil at all, although it had been growing lucerne for twenty years or more.

There were several thousand acres in the Murrumbidgee and Murray Valley, and it was, of course, a very difficult matter to attempt to survey those soils within a short time. They were not attempting to do it, but had given themselves twenty years in which to carry it out. The reason for the delay—if it could be called delay—was the fact that the work demanded special training, for the men could only get their experience in the course of the work, and they must be fully qualified for it if it was to be placed on a sound basis.

Soil Survey and Classification.

In the Murrumbidgee Irrigation Area they were working on a special type of soil which was suitable for rice growing. There again the Irrigation Commission thought the soil was a lucerne soil. It proved entirely unsuitable for lucerne, but most suitable for rice. This illustrated the necessity of strict scientific methods when soil surveys and soil classifications were being made. The Government expected the classification of the soil to be according to its productivity. There might be first, second, and third class forest land and first, second, and third class agricultural land. The third-class forest soil might be better than the first-class agricultural soil, or vice versâ. That classification was only a temporary one. It depended on the economic conditions of the time at which the classification was made, so that it was necessary for them to adopt a system of classification which would extend beyond any economic point of view and which would stand for all time.

In Other Countries.

There were two countries in the world in which soil survey work was being carried out as part of the duties of the Department of Agriculture—the United States and Russia. The United States had a fully competent soil survey, which had been going on for somewhere about twenty years. Their methods had been changing gradually, and to-day they had fallen in line with methods which were universally recognised. Something like one-third of the United States had now been completely surveyed. Unfortunately, the area that was of most interest to us in Australia (the arid zone) had only been surveyed in part, but a considerable portion of Texas had already been described.

The other country which had contributed most, possibly, to soil survey work was Russia. We were accustomed to regard Russia as one of the backblocks, but for something like fifty years the Russians had been engaged in soil survey work, and there was more known about the soils of Siberia than there was about the soils of Australia. The Russians had developed their methods so much that they felt themselves competent to draw two maps of Australia, indicating the soil types—one in 1914 and the other in 1928. These two soil maps were really wild guesses, but at the same time they were shrewd guesses, and one of Professor Prescott's purposes was to correct Glinka's guess and place it on a sound scientific basis based on observation. A soil survey map from an advisory point of view would be of great benefit. For instance, there was the case of the Renmark survey. The Irrigation Commission was actually waiting for the soil map of Renmark and within a day of its being drawn up were able to call a meeting and to act immediately on that survey. There were something like 2,000,000 acres of land in the Murray Valley which could be irrigated, and this would be done when the Hume dam was completed. He believed there were more like 10,000,000 acres which were capable of being irrigated—that is, they had the proper slope, and other features. It was obvious that they must utilise these 2,000,000 acres in such a way that they would be as productive as possible. To do that they must have a knowledge of the various soil types in that area.

Russian Research.

The next scale in connection with soil maps was the broader one, in which one could make full use of scientific methods. He had already indicated that the Russians were able to classify soils in such a way as to map a whole continent, and that was based on a recognition of two main factors—one of which was the recognition that the soil is something in itself. The original soil classification was based on the fact that the soil came from granite or some partly disintegrated rock. The Russians recognised that the soil was something quite independent from its parent rock. They developed a technique in which they described the soil just as they found it. In that way they were able to classify soils into a series of types.

The lecturer continued:—The first type that they defined is known as the Podsol or Ashlike soil, and this type is found in the Wallum country of Queensland or the gray soils around Brisbane. It is generally regarded as forest savannah country such as the pine forests of Northern Europe and Northern Siberia.

The next type is one which was not familiar to the Russians, known as the Brown Earth. It carries the greater part of the wheat in the Southern States, and it is one of the most serviceable of all soils in temperate regions. The fact that it does not leach readily means that it rarely needs liming. It may be low in plant foods, but under special conditions the Brown Earth may be rich in plant foods.

The Red Basaltic Loams are soils which are endeavouring to turn themselves into Brown Earths. They form a group by themselves, and are found in Queensland at Bundaberg, Childers, and the Atherton Tableland, also in Northern Tasmania.

There is a type of soil called Laterite which is of extreme scientific importance. It is one in which Mr. Hines and Dr. Bryan, of the Queensland University, are taking a great deal of interest at the present time.

The next soil type—which occurs in a zone where the rainfall is sufficient to produce a good native vegetation—is the famous Black Earth, first described thirty years ago by the Russian workers from their knowledge of the Russian Steppes.

Queensland Soils.

In Queensland there is the greatest development of Black Earths in the Empire outside of Canada. Black Earths develop under conditions where there is a rainfall of approximately 20 to 30 inches. They are seen at their best on the Darling Downs, and also the Liverpool Plains in New South Wales, and Peak Downs, Upper Callide, and Upper Burnett. They are rich in lime, so rich that it would always be found sufficiently marked for one to see it in a section of soil at a depth of from 15 to 30 inches. In South Australia, strangely enough, this Black Earth does not occur. There is another related series also very rich in lime, which was not described by the earlier Russian workers, but was actually discovered in Siberia. This series is very closely related to the Black Earth, and occurs in the rolling downs of the West, also in the black soil plains of the South-west and the Western plains of New South Wales in the Riverina and Wimmera. It is interesting to note that the lands at Hughenden are identical so far as soil type is concerned with the soil of the Wimmera. It is also interesting to note the difference that rainfall makes on the value of such land. In the Wimmera, it is worth about £15 per acre, and in Hughenden it would scarcely be worth 10s. per acre. The difference, of course, is entirely due to rainfall. The rainfall of Queensland is a summer rainfall, very unreliable. The rainfall of the Wimmera is just ideal for the production of wheat, and 40-bushel crops are quite common on that soil. The Riverina is a little less reliable, in so far as some of the rain comes in summer. Similarly in Queensland the Brown Loam or the Brown Downs soil is not a wheat soil, except in the Darling Downs, but is essentially a sheep soil.

In Africa, where these Brown soils were also developed, they were used for sorghum growing, and there was a possibility that the solution of the feed problem would be found if it were recognised that this soil is essentially one of the best growing soils if the climatic conditions could be studied sufficiently to get an appreciation as to which crop would be most suitable for the growing of sufficient fodder.

The Basalt Series.

The next are the Basalt series, such as are found in the Mallee country and at Oodnadatta. On this soil in the Wheat Belt of South Australia, crops are being produced with a rainfall of less than 6 inches.

"I would like to get some expression of opinion from the people here in Queensland," continued Dr. Prescott, "regarding the way in which the Commonwealth work can be linked up with the work that is projected for Queensland itself." It was one of their aims to publish a soil map of Australia in reply to the one published by Glinka last year. He was hoping that such a map when published in Australia would lead to discussion among scientific people, so that the map could be corrected by agricultural officers and surveyors, mining engineers, &c. As an aid to that work maps were being prepared and in part published in South Australia and Western Australia, showing the distribution of native vegetation prior to settlement. The surveyors throughout Australia had discovered very early that the native vegetation was a very fine index of the possibilities of the soil. He would suggest that one of the things that could well be done in Queensland would be the preparation of a map showing what was already known of that native vegetation and of the soil types.

Future Plans.

The Commonwealth Division of Soil Research had not yet been founded completely. The agreement with the University of Adelaide would date as from the 1st June, 1930, and it was their intention, in addition to having a map by a man working on soils problems, to have a soil survey staff which would be trained in the irrigation areas of the Murray, and which would eventually take an interest in soil problems throughout the whole of Australia, and if such a survey staff could be associated in the initial work of the Queensland survey, they would be very happy to secure co-operation in that way. The future of the soil survey of Queensland would depend very largely on the men who were placed in charge of that work, and the closer settlement and economic development of Queensland.

DISCUSSION.

Mr. H. T. **Easterby** (Bureau of Sugar Experiment Stations): Does the Commonwealth intend to prepare a soil map for the whole of Australia eventually?

Professor **Prescott**: What I personally hope to do as a result of this visit to Queensland—because Queensland is the key for the whole of Australia—and also my visits to Tasmania and Western Australia, is to write a discussion for the benefit of my Australian colleagues, of the principles underlying modern methods of classification, and in the course of that discussion I hope to put right Dr. Glinka's two maps. I already have a tentative map of Australia, which is not correct, but I hope to publish another map which will form a basis for future discussion.

Mr. **Harvey** (Lands Department): The Development Committee is faced with many problems in survey, more particularly in areas that are likely to become closely settled, and it would be helpful to us if Dr. Prescott could indicate to us some of the methods for more detailed examination of the soils in closely settled areas, and if he could indicate the type of survey that is required for the different conditions of settlement, I am sure it would be of great help to the committee.

Professor **Prescott**: That, of course, is a question of detail, and is one reason why I generally insist on the soil survey being in the hands of well-trained men, who are sufficiently responsible to select their methods for themselves. Mr. Taylor has a free hand in that direction entirely. The detail required in a survey of blocks of 20 acres is very different from what is required for blocks of from 600 to 700 acres, which would not need the close survey necessary in an irrigation settlement.

The general principle is really to have a staff of field officers adequately trained in soil survey methods. They go to a certain district and set to work at once to define the soil types from a purely scientific point of view. Generally speaking, there are people in the district—officers of the Departments of Agriculture and Lands—who can give them some idea as to the possibilities of the district, and this would act as a guide for them in their work. We dig holes at intervals and examine the soil profile at a depth of from 4 to 8 feet, and in some cases deeper. That soil is described, and when the whole area has been covered, the surveyor gets to work and maps it out. We are also enlisting the assistance of the Royal Air Force to help us in our work. They have prepared mosaics of the whole of the Renmark settlement. Aeroplane maps do not show soil types, but they show very distinctly the native vegetation and crops, and I should say that half of our work has already been done by the Air Force in the Renmark area, and I would not like to commence any survey in irrigation areas without a preliminary aeroplane survey of the native vegetation. In Rhodesia an aeroplane survey has been made to determine biological formations in connection with prospecting, and it has been very successful.

Mr. **Swain** (Chairman, Provisional Forestry Board): As you know, Dr. Prescott, Queensland is a very huge place, and we have in mind the idea of making a soil survey of the whole of it in due course. I think the principal proposals are first of all to make an extensive survey of the whole, using the vegetation as an index, and then to concentrate on particular areas for an intensive survey. We apparently have done neither of those two things, and we as a committee would like to know just where we should start and how we should start. The suggestion of the Air Force seems to be a very good one. We know something of the question of vegetation, and Mr. Harvey (Surveyor-General) has prepared many maps. With regard to the detailed soil survey, the question is where we should start that intensive survey—whether it should be, say, in the Cooktown district, where we know practically nothing of the possibilities, or in the Brisbane district, which is capable of intensive development. That is the issue in my mind—where to start the intensive survey, whilst planning some extensive work on the whole soil survey of the State.

Professor **Prescott**: The actual starting point depends very largely on local circumstances, but I would like to say in the matter of soil survey that the surveyors should be permanently engaged as field officers, rather than that the soil survey should be a side-line. They must be gaining experience. Usually, in our organisation in South Australia we have a senior soil surveyor and junior surveyors, and as men become available I shall add to the junior staff. In the Brisbane district, I think you will find that Dr. Bryan and Mr. Hines would be only too pleased to co-operate with the Department of Agriculture.

Mr. **Graham** (Under Secretary, Department of Agriculture and Stock), in moving a vote of thanks to Dr. Prescott for his informative address, mentioned that the Development Committee had in mind a soil survey of Queensland, but they were only feeling their way in connection with that particular work. Mr. Brünnich (Agricultural Chemist) and other officers had done much that might perhaps form a basis for future work. Queensland would remain a primary producing country for many years to come, and soil surveys would have a most important influence on efforts to increase production.

Mr. **Easterby**, in supporting the vote of thanks, said that the Bureau of Sugar Experiment Stations had done much in the matter of soil surveys in Queensland. Dr. Kerr had been specially sent to America to study the methods adopted there, and the sugar industry in the State would benefit as a result of his experience in the United States.

Mr. **Brünnich** also spoke on the importance of Dr. Prescott's visit. He had been more or less responsible for the arranging of Dr. Prescott's itinerary, and knew that his visit would be of much benefit to the State.

Dr. **Prescott**, in responding, expressed appreciation of the work which Mr. Brünnich and others had done, of the fine spirit of reciprocity he encountered in Queensland, and of the practical and valuable assistance that he had received from officers of the Department of Agriculture, and of the cordial reception accorded him by co-workers in the scientific field.

SUMMER CULTIVATION IN THE ORCHARD.

In reminding orchardists that the cultivator should be kept at work in order to maintain the surface soil in a proper condition, officers of the Fruit Branch of the Department of Agriculture point out that the use of the cultivator not only maintains a surface mulch and destroys weed growth, but also encourages vigorous tree and bud development. Keeping the soil in good tilth is a very important factor in successful orchard management.

Water rises in the soil by the process known as capillary attraction. The rise of moisture in the soil and the checking of it may be demonstrated by a series of glass tubes, the first being very fine and the others somewhat wider in diameter. The tubes are set upright in and projecting well above the surface of a vessel containing water. It will be found that the water in the very fine tubes will rise to a considerable distance above the level of the water in the vessel, and as the tubes increase in diameter so the height to which the water rises in them decreases.

The soil particles run together, forming minute spaces through which the moisture rises to the surface of the soil, where during the hot summer months it soon evaporates. Cultivation tends to break down the capillary tubes in the top layer of soils, thus retarding the rapid rise of the moisture to the surface and reducing the loss of evaporation to a minimum.

Soil left in a very rough condition exposes a far greater surface to the air than when left with a fairly fine tilth. This rough condition may be advantageous during the winter months, but is not so during summer, for the larger the surface exposed to the action of the air and sun the greater the evaporation of moisture. Summer cultivation should tend to work the soil thoroughly to a depth of 3 or 4 inches, breaking down large lumps and leaving the surface fairly even.

The question as to how often the cultivator should be used during the summer will depend on circumstances. In non-irrigated areas where the land is fairly level and the likelihood of soil washing is not great the cultivator can be used frequently, and always after rain immediately the soil is in a fit condition for working. In areas where the summer rainfall is heavy and especially on steep hillsides, summer cultivation may have to be considerably modified. In such circumstances it is not always wise to work the soil down to a very fine mulch, and it may be advisable to leave a certain amount of weed growth in strips between the rows of trees across the hillsides. These precautions will tend to reduce the loss of soil during heavy rain by preventing in some measure the rush of water down the slope.

In irrigated areas the cultivator should follow each irrigation and fall of rain as soon as the soil is in a fit condition to work. The irrigator's motto should be: "The minimum of water with the maximum of cultivation." Well cultivated plantations require less water than poorly worked ones, and are not as likely to develop seepage troubles so early.

The cultivators should be kept going right through the summer until early autumn, at which period it is usually advantageous to allow the early rains to germinate the grass seeds, where green manure crops are not sown. The day of "all the year clean orchards" has passed, as it is recognised that organic matter is essential in the soil. This may be partly provided by the ploughing under of grass that is allowed to grow during the autumn and early winter months.

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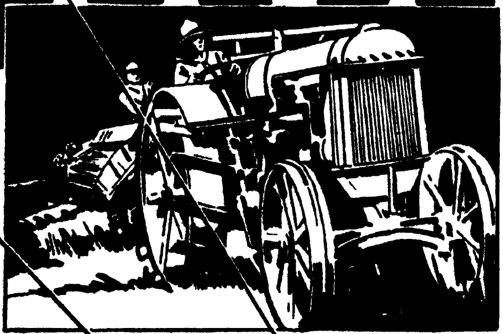

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THE FARM TRACTOR.

By E. T. BROWN.*

THE STEERING GEAR.

The steering gear must be kept in proper working order, whether the outfit be used solely on the land or partly for road work. For some reason or another this component of the farm tractor is frequently neglected. The operator should consider it an important duty to look after the lubrication of the steering mechanism.

Owing to the conditions under which the tractor has to work, mud and grit enter these joints, and, if allowed to remain, will inevitably, and in a very short time, produce wear and slackness. It is commonly thought that slackness is not of much moment. In reality, it is of great importance, not only from the mechanical point of view, but from that of safety as well.

When the tractor is new the driver finds that he can place his outfit wherever he may desire, and he has a feeling of confidence that he is able to do so. After neglect he finds that this is impossible, and he is, therefore, in doubt as to whether he can steer his machine at will in the desired direction. Failure to do this is, of course, of greater consequence on the road, but it is also troublesome on the land.

Points to be Looked After.

All joints should be lubricated in accordance with the maker's instructions. Grease should be used where grease is recommended; oil where oil is advised. Periodic attention to this part of the machine well repays the operator for the little trouble involved. It may prove helpful to discuss a typical steering layout and indicate those points that require lubrication, and also where a slackness may develop.

Beginning with the front wheels the first point is the bearing upon which the front wheels swivel when turning a corner. This is the stub axle swivel pin and is one of the chief parts to keep lubricated, and to look out for slackness. Secondly, there is the lever fixed to the frame wheel hub at one end and to a rod that may either lie across the tractor or be in line with the length of the frame. The former is found in the case of transverse steering; the latter in the case of fore-and-aft steering. The point where the lever is fixed to this rod—termed the drag link—requires lubrication, and if play appear, it should be taken up.

The same care should be extended to the other end of the drag link. The joint here is between the drag link and the drop arm or steering lever, which is fitted to the end of the shaft protruding from the steering box. This, too, is sometimes spring-loaded; hence requires no taking up, but it should be lubricated.

The Steering Box.

The steering box must be lubricated and looked after most carefully. There are many designs of steering boxes, of which the worm and wheel, the worm and nut, and the cam and roller are the most popular types. The maker's instructions should be followed faithfully, both as regards lubrication and taking up any play that may develop.

Returning to the front wheels, it is found that there is a rod tieing the two wheels together, this being known as the track rod. Its duty is to make one wheel turn when the other is moved by the steering gear. There is a joint at each end of this rod. These joints require lubricating, and, in time, stand in need of taking up.

Shock Absorbers for Tractors.

Shock absorbers are not usually fitted to farm tractors. This is certainly a mistake on the part of the makers, since the vibration is excessive when working on rough land. There is not the same need for these additional springs when the outfit is employed on the road, since no great speed is ever attained. The tractor owner is strongly advised to fit some form of shock absorber to his machine, since they reduce wear to a remarkable degree.

Shock absorbers may be divided into two main classes. These are the hydraulic and the friction. In the former the damping action is secured by a plunger or vane moving in oil or some other fluid. In the latter the rubbing action of two or more friction surfaces has the same effect in controlling the springs. The frictional type is the better of the two for the farm tractor.

It is generally necessary in the hydraulic type to replenish the liquid after every 5,000 miles with the special fluid sold for the purpose. When the arms are fitted with ball joints, these, too, must be lubricated periodically. The best form of frictional shock absorbers are those that incorporate a self-lubricating material. With these the only attention they require is after the first hundred miles, when the tension should be adjusted, this being necessary owing to the fact that the discs have bedded down. With other types it is necessary to renew the friction material from time to time.

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* In the "Farmer and Settler."

RURAL LIFE IN OTHER LANDS—VI.

By the EDITOR.*

JOURNEYINGS IN GERMANY.

Our last halt was at Cologne, where we reviewed briefly the development of the co-operative movement in Germany and its general influence on the improvement of rural conditions in that country.

We shall now go further up the Rhine, and then on to a consideration of some recent developments in German agriculture.

The Story of a Great River.

The Rhine has been a great commercial highway for many centuries; it is still a great traffic artery, and by a remarkable canal system it is united with the river system of Northern France on one hand and the Weser and the Elbe, two other famous German waterways, on the other. It is possible for large steamers to navigate it as far as Mannheim. From Cologne to Mayence, or, to be strictly accurate, from Bonn to Bingen, is the most historic and picturesque stretch of its long course from Switzerland to the North Sea. In that section, the most beautiful part of its whole course, ruined castles crown every romantic point and rocky crag. Its banks are clothed with sunny vineyards, and at intervals, along cliff-like margins, lateral ravines and valleys open up many delightful inland vistas. From the Seven Mountains, near Bonn to Andernach, the river seems to force its way through ranges of erupted rock, and flows through deep gorges which are a revelation of natural beauty. Historically, the story of this great stream is really the story of the western half of central Europe. In its first historical period its rich valley was probably the home of Celtic tribes whose possession was later disputed by the Teutons. Its second historical period began with the coming of the Romans who held up the advancing Teutonic tribes. Augustus, the Mussolini of the period, and his successors took good care to fortify its banks, and many Roman regiments were constantly in garrison there. Under Roman domination the Rhine valley became a great centre of civilisation and culture, which was later swamped by a Teutonic invasion. Under Charlemange, whose headquarters were at Aix-la-Chapelle, much of its ancient culture was restored. During the early middle ages the Rhine formed the most cultured province of Germany, basing its civilisation on its Roman past. It was then the classic river of Europe and has remained since the subject of romantic story and legendary lore.

To the stranger, however, if one ignores for a while its historical associations, but for which, as one lives longer on its waters or its banks one feels such a remarkable fascination, it is not difficult to think of other waterways that rival it in natural scenic splendour. Our own Hawkesbury River is, in my opinion, quite as beautiful; so, too, is the Hinchinbrook Channel, though of quite a different order, in North Queensland. The Derwent in Tasmania, shadowed by the great mass of Mount Wellington, also may fairly be thought of in comparison, not forgetting that interesting Scottish waterway, the Caledonian Canal, or that picturesque channel that leads up through the Kyles of Bute on the run from Glasgow to Ardrishaig. Our own beautiful Brisbane River at Hamilton Reach, when the setting sun is gilding the crest of the D'Aguilar Range, will also compare quite favourably with the Rhine.

Bonn to Coblentz.

After leaving Cologne with its majestic architectural monuments and great modern bridge, we stopped again at Bonn, a well-ordered town with a world-renowned university and the birthplace of Beethoven. There, anyone musically inclined may join in a perennial argument as to the relative merits of Wagner and Beethoven. Bonn shares in the wealth of myth and legend woven around the Rhine, and Drachenfels dominates a near-by river bend. Following the river further, the Seven Mountains with their peaks, cones, and rounded ridges densely timbered were passed and then we came to Coblentz, at the confluence of the Moselle and the Rhine, the centre of an important wine trade. Its situation at the junction of two of the most picturesque rivers in Europe is one of striking beauty. We had come through great grape country and some remarkably fertile plain lands, or what we would call rich river flats. The extraordinary industry of the German vinegrower was evident in his remarkable system of terracing the steep river banks, and that reminded one so much of the hanging gardens at Thuin, where once we were billeted, near Charleroi in Belgium. The steep slopes lined with walls and arches, showing how the soil is held and the vines, for which Rhineland is so well famed, are carefully preserved, were eloquent of years of patient industry. It was worth the journey itself to see those wonderful vineyards set on rocky terraces with the vines bright with the green gloss of early summer amid outcropping crags decked with brownish-green and purples of moss and lichen.

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* In a radio address from 4QG.

Historical landmarks were everywhere; there was a story in every contour. It was at Coblentz that Julius Caesar and his legions crossed the Rhine. Other famous landmarks spoke of the history of the river down the centuries. Looking out across the stream was the great monument to William I. of Prussia. All this was very interesting, but, with what significance was regarded the great fortress of Ehrenbreitstein frowning on the river from its seemingly impregnable crag crest, with the "Stars and Stripes," the symbol of alien occupancy, floating freely in the breeze above its crenellated battlements!

Invading legions had once more crossed the Rhine at Coblentz. The Briton held the bridgehead at Cologne, and thus history was once again repeated.

Agriculture in Germany.

Though it is a very attractive by-path, this brief excursion into history and survey of very pleasant romantic scenery, we will return to the rutted roadway of hard though not uninteresting facts and consider for a while some aspects of recent agricultural development in Germany.

At a critical period in the Great War it became apparent that, if agriculture had made no more progress in Germany than it had in Great Britain during the previous ten years, the German Empire would have been at the end of its food resources long before the end of the second year of the war; and that, as a matter of fact, the war was being fought by it just as much on the agricultural as on the military organisation of the nation. It is interesting and useful, therefore, to consider just what had been the development of agriculture in Germany, and how that development had been accomplished.

It was commonly believed then that British farming was the best in the world. Certainly, throughout the 19th century the British people led all the other nations, relatively at any rate, in agriculture. Success in food production was the criterion of good farming in the old country in the 18th century. During the 19th century Great Britain was not altogether dependent on the products of its own soil and the farmer's aim and claims were modified. He reduced his ploughed fields and extended his grazing areas. On the score of good cultivation, high yields of certain crops, live stock breeding of a very high order, and machines and implements of top-grade construction, British farming still holds the leading place; but if we return to the criterion of success accepted by our old improvers of husbandry, from whom Germany learned—the quantity of production of food from the soil—then it seems that the agricultural position in the old land would suffer in comparison with that in Germany.

An Interesting Comparison.

An examination of available figures shows that on each hundred acres of cultivated land—that is, arable and grass lands—(excluding the poorer pastures) the British farmer feeds forty-five to fifty persons, the German feeds from seventy to seventy-five persons. (These figures are based on the estimate that, of the total "energy value" of food consumed, Great Britain imports about 60 per cent. and Germany imports 10 per cent.) The British farmer grows 15 tons of cereals, the German farmer grows 33 tons; the British farmer grows 11 tons of potatoes as against the German farmer's 55 tons. The British farmer produces 4 tons of meat, the German farmer 4¼ tons. In milk the proportion of production is 17½ tons against 28 tons, and while British beet sugar production was, until recent years, quite negligible, the German production is 2¾ tons.

The area of cultivated land in Germany has, however, decreased in later years. The agricultural population has also decreased. Rather less than more farm labour is being employed now than in former years. From those facts it may be fairly deduced that larger production in Germany is due to better farming. The soil has been better cultivated; crops more skilfully manured; plants and animals improved in type; the use of improved stock foods extended; and animal husbandry faithfully followed. Side by side with improved technical methods, improved business methods were employed and the profits of agriculture have, in turn, been used in further developing the means of production and the processes of manufacture and distribution.

Efficient Agricultural Education.

The chief factor in this development was unquestionably a well-organised system of agricultural education. Investigation at the research stations established the exact uses of fertilisers; trustworthy advice was supplied both personally and in various forms through the press. The German farmer, being accustomed to regimentation, soon brought his methods into line with those set down by recognised authority. Sound lessons, of course, may be taken from all this.

The German farmer produces about the same weight of cereals and potatoes per acre as the British farmer, but, as has been shown, a much greater weight per 100 acres of cultivated land. He produces about the same weight of meat and nearly twice as much milk for 100 acres of cultivated land. He feeds from seventy to seventy-five persons for 100 acres of cultivated land, while the British farmer feeds from forty to fifty.

The German farmer has attained this position in the last forty or fifty years. The soil and climate of Germany are less favourable than those of Britain. The actual methods of tillage in Britain are not inferior to the methods adopted in Germany. The difference in production is due chiefly to the circumstance that in Britain more than two-thirds of the cultivated land is now in grass, while in Germany less than one-third of cultivated land is in grass.

German land is mostly tilled by peasant owners, British land by tenants. The German depends to a great extent on women labour provided by the families of the occupiers. Wages are relatively low in Germany, and rural industries help to provide winter employment and tend to cheapen summer labour.

In Germany, in organising production, the farm-credit system is generally well adapted. Co-operation is largely resorted to. Societies have been created to provide rural leadership.

The national economic policy has also favoured the German farmer. The general effect of these agencies and influences have been the production of a very rapid improvement in the technical methods of the German farmer.

It is not meant to create the impression that the German farmer is much more skilful than the British farmer (I have taken conditions in Great Britain up to a few years ago merely for convenient comparison); he is not, nor is he likely to be. The British farmer has not lost, nor is he likely to lose, the art of good husbandry, but he has had to modify his methods for reasons that are quite obvious to any student of economics, political and otherwise. Through force of circumstance, a big proportion of ploughed land has gone to grass in British counties.

Two Fundamentals in Rural Industry.

In any "speed the plough" policy there must be two fundamentals, which the German has recognised—security of capital and sufficiency of labour. Though that sounds like an ordinary trite truism, it must be remembered that behind that truism there are points that are often forgotten and for which provision must be made in any policy that seeks to improve and develop the agricultural industry.

To summarise the impressions produced by a brief, and admittedly incomplete, study of progress in German agriculture, the conclusion is that in points of agricultural policy we may learn something, and from the admirable machinery—administrative, educational, and commercial—set up to lead, teach, and finance agriculturalists, we may learn much. On the other hand, from the actual methods of German farming there is relatively little to learn. In Britain, the tillage of the soil and the breeding and management of stock are as good as if not better than in Germany. The difference in production is because the plough is worked harded in Germany; and, for the farmer, the economic conditions are, or were, speaking generally, easier.

In recent years, we know, there have come revolutionary changes to agriculture in Germany, and rural industry there is faced with the social and economic problems that are common to every country in the world to-day.

BUTTER BOXES.

SUITABILITY OF QUEENSLAND TIMBERS.

A CONFERENCE convened by the Minister for Agriculture and Stock, Hon. H. F. Walker, was held at the Department of Agriculture and Stock recently for the purpose of discussing the type and design of butter box most suitable for Queensland requirements. Representatives from both the dairying and timber industries were invited, and those present were:—Hon. H. F. Walker (in the chair); Messrs. T. F. Plunkett, C. H. Jamieson, H. M. Russell, MM.L.A.; E. Graham, Under Secretary, C. McGrath, Supervisor of Dairying, G. H. E. Heers, Senior Grader (representing the Department of Agriculture and Stock); N. E. Hancock, Manager, Forest Service Timber Yards, E. C. Tommerup, B.Sc., Forest Assistant (representing the Forestry Service); J. H. Hancock, S. J. Cossart, C. C. Grimley, F. Haas (representing the timber interests); J. Purcell, Chairman of the Butter Board; W. T. Harris, Secretary, Queensland Co-operative Dairy Companies Association; D. Saxelby, F. W. Uhlmann (representing the Butter and Cheese Factory Managers' Association).

Apologies for non-attendance were received from Messrs. W. A. Russell, M.L.A., and J. T. Tod (Chairman, Queensland Co-operative Dairy Companies' Association).

The Minister in opening the conference welcomed the representatives of the several interests concerned and stressed the importance of both the dairying and timber industries. He mentioned that Queensland was the largest exporter of butter of any of the States of the Commonwealth, and that it required 1,320,000 boxes each year to contain the butter produced in this State, and that the sawmilling interests received approximately £127,000 each year from the dairying industry on account of the butter boxes supplied to meet trade requirements. The Minister then called attention to the agenda item that had reference to the essentials to be sought in selecting a suitable container to meet the requirements of the industry. These were listed as follows:—

(1) Freedom from timber taint.
(2) Strength of material.
(3) Effective methods of fastening.
(4) Facility of opening and closing after grading or examination of contents.
(5) Practicability of adopting a uniform box, taking into consideration the location of factories and patents involved.
(6) Suitability for packing by hand or machine.
(7) Economics—(*a*) Cost of boxes; (*b*) saving in thin timber.
(8) Attractive appearance of box.

Mr. Walker also quoted the contents of a cablegram from the Agent-General in London relative to the quality of Queensland butter on its arrival in London.

Reported Timber Taint in Butter.

In the discussion that ensued there was unanimity of opinion as to the desirability of utilising boxes made of Queensland timber to the fullest possible extent. The reported incidence of wood taint was fully ventilated. Those present were definitely of opinion that timber suitable for butter-box purposes was available within the State, and the occurrence of wood taint flavour in butter was attributable to the omission to exercise adequate supervision in the selection of pine intended for the making of butter boxes. Provided proper precautions were taken to eliminate timber which was likely to be capable of conveying wood taint, no trouble resulted. It was mentioned that butters packed in boxes made of Queensland timber had met with success in competition with butters produced in other parts of the Dominions at many of the important dairy shows which had been held in Great Britain, New Zealand, and within the Commonwealth, thereby demonstrating that Queensland was capable of producing a timber that was eminently suitable for the making of butter containers. The conference agreed on all essentials and resolved that a committee, composed of representatives of the several interests, should be constituted to give consideration to the various details and prepare a report for discussion at a later conference.

The conference recognised that wood taint flavour was to an extent discernible in a proportion of the butter supplied to the overseas markets, but was unable to determine definitely the exact percentage affected by wood taint. It was, however, of opinion that there existed a tendency to exaggerate the proportion of affected butter, and they felt that there was a possibility that on occasion flavours other than those actually attributable to wood taint were included under that designation, which appears to be synonymous with the terms "sidey" and "toppy" used in Great Britain. However, the seriousness of there being ground for complaint against the quality of a product from this State was fully appreciated, and those assembled were confident that the action they had in view would quickly remove any foundation for complaint under the score of wood taint.

BUSH FIRE CONTROL.

Every summer heavy losses are sustained in rural districts as a result of fire. Some of this loss is inevitable, but a large proportion might have been prevented by timely precautions on the part of individual landholders and some organised scheme of fire-fighting. With the summer months at hand, the following advice on the preventive aspect, contained in a paper read by Mr. S. Wilson, Lake Cowal, New South Wales, before a conference of farmers, may be submitted for the consideration of landholders generally.

Once a fire has started, observed the speaker, quick action to get it out is essential, but prevention is the main thing in bush fire control. As preventive measures all farms and grazing properties should have at least four furrows ploughed round all paddocks, a second set of four furrows ploughed not less than 11 yards from the first set, and all timber between these furrows burnt off prior to the grass becoming dry. A further set of plough furrows should intersect all large areas. The ploughing should be done so that it leaves the one open furrow inside the area between the two sets of ploughing, thus facilitating the burning of the buffer area by only two men.

Formation of Local Brigades.

All landowners should form district brigades, and agree on a set of rules, such as binding themselves to at once cease the work they are at and rush off to any fire that is within a certain distance of their property, say, five to seven miles, as a minimum. For brigades to be effective the following measures should be adopted:—(1) An equipped water tank of 100 or 200 gallons should be provided for each 2,560-acre holding, or one for all smaller holdings aggregating 2,560 acres. (2) An agreement should be made that the man whose property the fire is on shall be boss and give instructions, or chaos will soon result. (3) When a fire has gained larger dimensions several bosses are required, and they should then work on an arranged plan, particularly as to where the advance trail should be.

The Necessary Plant.

The plant should consist of a spring cart with a good horse to carry a 100-gallon tank and pump, with sufficient hose to reach 12 feet past the horse's head; also an ordinary washing tub and several buckets. A loop of rope should be tied on to the hames with the hose through it to prevent the horse treading on the hose. A motor lorry instead of a cart greatly increases expedition, which is most important. Another tank of 200 gallons on a dray for replenishing the 100-gallon tank should be provided, with two horses to pull it, as if filling from a dam or tank that is low it might get bogged. Several axes and shovels are necessary, also plenty of beaters fastened on to mallee handles or similar sticks.

Beaters made of tanned leather are the best, but have been expensive in recent years. A good useful beater can, however, be made out of a piece of saddle cloth or even half a wheat bag twitched on with wire to the handle. Beaters should be dipped in water, which should be carried in the tub already mentioned, as if dipped in the 100-gallon tank the ashes, leaves, grass, &c., off the beaters will choke the pump, and this may occur at a most critical juncture.

To make fire-lighting trailers, cut a wheat bag down the sides, then cut it crossways—with shears preferably—into strips, say, 16 to 18 inches long. Roll those up, and put a twitch of double wire round one end of the roll, leaving a small loop, and another twitch further along, so as to leave the final 6 inches loose. Dip this loose end in boiling fat. So as to be prepared, these should be made every spring, and if not required they can be replenished with fat the next year. Before using, the loose end should be split into three pieces with a tomahawk (which should always be carried by the trail-lighter at the back of his belt), and, for a handle, a double-twisted piece of No. 10 wire about 5 feet long fastened into the loop of the wire twitch. Some water should then be poured on the top end to prevent the whole trailer from catching fire, and water added whenever required. To stop the trailer burning during intervals, put a shovel of earth over it.

A bag rolled as described and damped with water, with the end saturated with kerosene, is a good substitute; the man using this should carry a gallon tin of kerosene in his hand.

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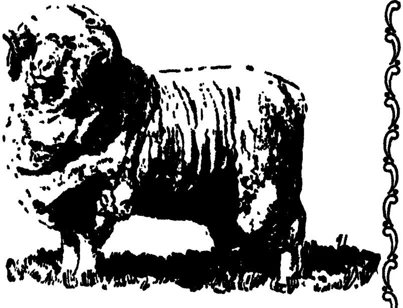

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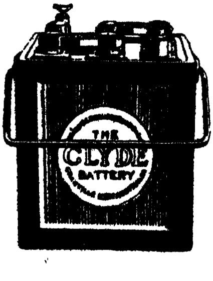

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Answers to Correspondents.

BOTANY.

(Replies selected from the outgoing mail of the Government Botanist, Mr. C. T. White, F.L.S.)

Sophora Fraseri.

W.F. (Kingaroy)—

Your specimen is a native shrub of the legume family (*Leguminosae—Sophora Fraseri*). It occurs in a number of places in South-eastern Queensland, but we cannot say it is anywhere very abundant. Species of Sophora in other parts of the world are said to contain poisonous properties which are very powerful and this is the first instance of the plant coming under our notice, but owing to the suspicious nature of other members of the genus it would be as well to get rid of it from paddocks where it is growing.

Melilot or "Hexham Scent."

E.T.F. (Sandy Creek, Kilcoy—

The taller growing plant is *Melilotus parviflora*, the Melilot or Hexham Scent. This plant is fairly common in Queensland, comes up with the winter or spring rains. It is widely spread as a weed in most warm temperate countries and has some value as a fodder though its peculiar scent is transferred to the cream of dairy cows that are fed on it. This plant was boomed some years ago as King Island Melilot, and in sandy soils, where ordinary lucerne will not grow, has some value for fattening purposes.

Creek Cherries.

G.C.F. (Toobanna, Ingham Line)—

Your specimen is *Eugenia tierneyana*. Several species of Eugenia grow along creek banks in Queensland and are commonly known as Creek Cherries. The one you sent is quite common in Northern Queensland, and we have had no reports about it causing trouble in any way. Most of the species of Eugenia yield edible, rather acid fruits. Unless, however, one knows very definitely the properties of these plants it is very difficult to say much about them, **owing to their close relationship to the Finger Cherry (Rhodomyrtus macrocarpa), known to cause blindness in persons eating it.**

Sand-Binding Grasses.

Inquirer (Brisbane)—

It is always a difficult matter to get sand-binding grasses for the tropics. There are, however, several native grasses that grow in North Queensland, such as *Stenotaphrum subulatum*, *Spinifex hirsutus*, *Lepturus repens*, and *Thuarea sarmentosa* and others that might be obtained from neighbouring islands and planted at Saibai. These sand-binding grasses are usually not propagated by seeds but by roots. We think Panicum muticum is also worthy of trial, but do not know how this would grow in a moving sand dune. However, a bag of roots could be obtained from Cairns, or from the Director, Botanic Gardens, Rockhampton.

Central Queensland Plants Identified.

M.L.F. (Dalma, via Rockhampton)—

Your specimens are:—

1. *Usnea* sp. A lichen. Sometimes called Old Man's Beard.
2. *Alphitonia excelsa*. Red Ash. Family Rhamnaceae. Cattle and horses are fond of the leaves and the tree is a valuable fodder species.
3. *Myrtus Hillii*. (?) Ironwood. Family Myrtaceae.
4. *Dodonaea viscosa*. Wild Hops or Hop Bush. Family Sapindaceae.
6. Doubtful. Could you watch the tree for flowers and send down specimen twigs about 6 to 8 inches long? You could dry the specimens for a few days by pressing them in newspaper three or four times in the course of one week.

The piece of bark is of little value in most cases for determining species. Could you not obtain a leaf-bearing twig?

Dusky Coral Pea.

S.R.E. (Esk)—

Your specimen is *Kennedya rubicunda*, the Dusky Coral Pea, a rather handsome climber of the family Leguminosae, found in all the Eastern States.

Daisy Bush.

E.R. (Lamington, via Beaudesert)—

Your specimen is *Olearia nernstii*, a species of Daisy Bush found growing in several mountain localities in South-eastern Queensland. It is very closely allied to the garden Asters and by some botanists the genus Olearia is as a matter of fact not regarded as distinct from Aster. The plant is worthy of cultivation as an ornamental shrub and we think could be grown quite easily and successfully from seeds.

Curled Dock.

F.B. (Goomeri)—

Your specimen is the Curled Dock (*Rumex crispus*), a common European weed naturalised in most warm temperate countries. It is often seen about Brisbane as a weed of waste places, but is most abundant on the Darling Downs, where it is somewhat of a pest on the wheat fields. Docks as a rule are generally regarded as having little or no fodder value.

Burr Trefoil.

J.K. (Spring Creek, Stanthorpe)—

Your specimen is *Medicago denticulata*, most commonly known in Queensland and New South Wales as "Trefoil" or "Burr Trefoil." It is a native of Southern Europe, but now occurs in the pasture lands of most of the warm temperate countries of the globe. It is one of the most abundant plants growing in Southern Queensland and New South Wales, particularly in the wheat belts, and has largely displaced the original native pastures. It is a comparatively short lived plant, generally commences growth in the autumn, seeding about September or October. When in seed the plant bears a number of burr-like pods. These, however, are eaten by sheep and are most nutritious. Although not so palatable as the clovers and some herbage, it is fairly nutritious and is eaten readily by stock.

Twin Leaf.

T.H.M. (Columboola)—

The specimen is a species of Twin Leaf, botanically *Zygophyllum apiculatum*. About half a dozen species of the genus Zygophyllum occur in Australia and all probably possess similar properties. They have been accused, both here and in the other States, of being poisonous to stock, but not on very definite grounds. Though the present species is extraordinarily abundant in parts of Queensland, and during times of drought may be the only green seen, we do not remember having seen stock eat it to any extent. The late Mr. J. H. Maiden, however, writing in the "Agricultural Gazette" of New South Wales (vol. xi., p. 24) quoted Mr. Max Koch, a well-known botanical collector, as stating, about Zygophyllums, that "they form, in a good season like the present one, a most valuable adjunct to the winter pasture, providing succulent, if not very nutritious, fodder for both cattle and sheep. My horse is always ready to make the best use of a short halt by feeding on the plants indiscriminately and with a relish, and the cropped appearance of a neighbouring paddock which is stocked with sheep is ample proof of the usefulness of these plants. The foliage being of a watery nature, enables the sheep to do without a drink during the winter months as long as the herbs last, and to feed in the more remote portions of the paddocks. This is a matter of great advantage to the sheep-farmer, for the pasture near the wells (Mr. Koch is speaking of the dry country in the interior—J.H.M.), which is more or less heavily punished during the ever-recurring spells of dry weather, has an opportunity to recover. They mature seed in abundance, and perpetuate their kind regularly, provided seasonable rains fall at the end of February or the beginning of March." This would seem to indicate that the plants are not poisonous, but have a definite fodder value.

Lasiandra.

T.H.B. (East Barron, via Atherton, N.Q.)—

Your specimen is *Pleuroma splendens*, generally known by its other generic name of *Lasiandra*. It is a native of Brazil and belongs to the family Melastomaceae. We have several native shrubs of the family Melastomaceae, one or two of them with rather pretty flowers but not quite so large and showy as the garden Lasiandra.

Johnson Grass.

J.C. (Childers)—

Johnson Grass is poisonous to stock, especially in its more luxuriant stages, although very few deaths have been reported from it in Queensland. The only ones have been occasional losses among dairy cattle. Like Soudan Grass, Imphee, and other plants of the Sorghum family, Johnson Grass possesses a prussic-acid yielding glucoside, and if eaten in quantity may cause trouble. The symptoms you described, however, do not tally with poisoning by this grass, for when this does occur death is very rapid.

"Mexican Clover"—Common Flax.

A.C.R. (Bli Bli, via Nambour)—

1. *Richardsonia scabra*, a native of tropical America, but now common as a naturalised weed in most warm countries. It has been boomed in America as a fodder under the name of Mexican clover, but does not, of course, belong to the true clovers, or to the legumes at all, but to a totally different family, the Rubiaceae. Our experience in Queensland generally is that stock rarely touch it, though we have had one or two reports to the contrary.
2. A plant with blue flowers, is the common flax or linseed, *Linum usitatissimum*. It has apparently come up from some linseed that has been spilt or as an impurity in agricultural seed.

Roughage.

The Agricultural Chemist, Mr. J. C. Brünnich, in answer to a correspondent, advises as follows:—

"Under the term roughage we include all forms of dry grasses, chiefly found in the form of stubble after seeds have all been shed. This stubble is practically the only food available at the end of winter in many districts. The nitrogen contents are generally very low, as such roughage contains, as a rule, only from 1 to 3 or 4 per cent. of protein, whereas the green grass may contain as much as 15 to 18 per cent. of protein.

"The use of licks made from salt and lime phosphate, either in the form of bonemeal or finely crushed Nauru phosphate, not only supplies the animal with the absolutely necessary amounts of lime and phosphorus, but also greatly increases the digestive powers and appetite of the animal, and a larger amount of the poor roughage can be eaten and digested, which is of utmost importance when only such poor quality of fodder is available. For general purposes we recommend simply a mixture of one part of ordinary butcher's salt and two parts of finely-crushed Nauru phosphate. The great trouble is to make the animals consume a sufficient amount of this lick, as sheep require about 3 oz. per week per head, and cattle at least 1 lb. per week. The addition of a little molasses or some sort of meal is generally recommended to make the lick more palatable."

PIG RAISING.

(*Selected from the outward mail of the Senior Instructor in Pig Raising, Mr. E. J. Shelton, H.D.A.*)

Points in Pig Breeding.

M.V.I. (Biloela)—

As a general rule, stud boars and breeding sows are productive for about seven years of their life. Neither male nor female should be used for breeding until they are at least ten months old, and if they are twelve months old (especially in the case of the sow) so much the better. Young boars may be given a sow or two when from nine to ten months old, but should not be put to active service under one year old. Both boar and sow should be culled after passing eight years of age, while if for any reason they become unproductive before reaching that age, it will pay to get rid of them. Both are in their prime when between three and four years old, though many boars are reliable stock getters and many sows dependable mothers for a longer period than eight years.

Generally, however, the teeth wear down and become uneven after eight years of age and the animal is not able to forage to the same advantage as younger stock, while in most cases as the stock increase in age they become heavier and less active and the sows overlie a good many of their young ones.

It is preferable, if at all possible, to have boar and sow of similar age and size, that is to say, it is inadvisable to mate an aged and heavy boar to young sows, as accidents frequently happen from following such a practice and it is inadvisable to have a very young boar for mating with aged sows by reason of the fact that very often animals of varying ages fight a good deal and aged sows will often punish a young boar to such an extent as to practically ruin him for service.

Aged animals also very often become lethargic and disinclined to breed though they are very strong and determined, and if permitted to feed at the same trough with younger stock will cause a good deal of trouble and losses in fighting among themselves.

Dealing with the question of mating the Tamworth boar with Berkshire sows versus the mating of Berkshire boar with Tamworth sows, it would be well to add that there is no hard and fast rule to follow in the mating of various breeds for the production of pork and bacon pigs, nor does it follow that the Tamworth-Berkshire cross is the only one advised. Experience proves it is largely a matter of individuality of the various animals used, together with any particular fancy a breeder may have for one or other of the types commonly used. It is often a difficult problem to pick and choose in the matter of selection of breeding stock, for in many instances there is a shortage of one or other of the breeds and a liberal supply of others. Usually it is possible to secure reasonably good Berkshire sows in districts where Tamworth sows are in very short supply, and in these cases we recommend the use of a really good Tamworth boar; in any case the Tamworth boar is a reliable stud sire and is frequently more active and dependable than the Berkshire.

On the other hand a first class Berkshire boar mates to advantage with selected sows of the Tamworth and first class Tamworth-Berkshire type, the latter sows being in great request in most districts where pig-raising is carried on.

The same observations apply in the case of breeds other than the Tamworth and Berkshire; that is to say, a Berkshire boar mated to a Large Black sow should be productive of good results, the sow being large and roomy and of a type noted for prolificacy and heavy milk production.

Other of the larger breeds like the Gloucester Old Spot, Duroc-Jersey, and the Chester White may be used in much the same way, while under a proper system of feeding and management, purebred pigs of these breeds may profitably be produced as good pork and bacon pigs. The Yorkshire types, being of more medium build, are suited for porkers and light bacon pigs.

It does not pay to castrate aged boars with a view to fattening them for market, for the price they realise would not pay for the feed and expense incurred in their handling. If feed is plentiful and reasonable in price, old sows may be disposed of for small goods purpose, but these matters need careful study.

Points in Pig Feeding.

J. de V. (Mapleton)—

It is quite evident the illness from which the pigs suffered had as its primary cause improper diet and unbalanced rations, followed by inflammation of the stomach and intestines and severe constipation. It is possible also that some of the maize was mouldy and rotten, and that the troughs had not received a necessary daily cleansing.

Pigs fed on unbalanced rations, like a ration consisting almost entirely of boiled maize, would naturally have a craving for flesh-forming materials, minerals, and vitamins, and would in the absence of these resort to eating sand and soil, and possibly indigestible fibrous matter. It is very unkind and unprofitable to lock animals up in bare dusty pens or yards and feed them almost entirely on boiled maize, good and all as that food is when properly balanced with flesh formers, minerals, &c. In fact there is no profit at all in forcing pigs to consume large quantities of comparatively high-priced food and refusing them the more bulky succulent nutritious green foods. These green foods—lucerne, field peas, green corn stalks, sorghums, &c.—are all cheap and efficient foods when fed with maize and other concentrated foods, plus, of course, an abundant supply of clean drinking water, from an absence of which pigs may greatly suffer. There is no reason at all why pigs should suffer from such ills if they are properly fed and cared for.

Rice Meal for Pigs.

J.J.M. (Cinnabar)—

According to Henry and Morrison's "Feeds and Feeding," rice bran and rice polish, both products of the same class as rice meal, though not so concentrated, are economical foods for pigs. One hundred pounds of rice polish being equal to 133 lb. of corn and 100 lb. of rice bran equalling 112 lb. of corn. Rice meal and similar rice products are, however, relatively poor in crude protein and fat, hence it is not a good food from a purely growth point of view. The meal is a by-product from the manufacturing process of commercial rice; the small, broken, stained, and surplus grain is also ground into a meal and is doubtless mixed with the by-products in milling. It has a good feeding value, when fed with milk, maize, and other cereal meals and green foods. It is usually valued at about the same as pollard and is sold in bags containing 5 to 7 bushels (approximately 100 to 140 lb.).

Recent samples of rice meal analysed by the Department of Agriculture and Stock, Brisbane, gave the following result:—

Moisture	10.5 per cent.
Crude protein	12.6 per cent.
Crude fat	13.9 per cent.
Crude fibre	8.9 per cent.
Crude ash	8.8 per cent.

Pollard usually carries about 10.5 per cent. of moisture, about 15 per cent. of crude protein, 3.5 per cent. of crude fat, 6 per cent. of crude fibre, and 3 per cent. crude ash.

It will be seen therefore that rice meal carries less protein than pollard, but has a higher fat, fibre, and ash content, this indicating that it would need to be fed in conjunction with foods carrying more protein like milk, grain, lucerne, or lucerne chaff (soaked), peas, or pea meal, or even with a percentage of pollard if milk and green foods were in short supply. Where pigs do not do well on rice meal it would pay to reduce the supply down to a minimum and increase the supply of other foods like maize, for rice meal does not appear to be as palatable or as appetising as maize.

Try soaking the rice meal in milk or milk and water and if possible add a percentage of lucerne chaff. The addition of a very small percentage of salt and bone meal would also prove of considerable advantage, and in each of these cases the cost of feeding would not be materially increased, especially if a good supply of green lucerne or other green stuff could be worked in. It is useless trying to force pigs to consume meals, &c., on which they do not develop satisfactorily, hence if these suggestions do not lead to improvement we would recommend cutting out the rice meal and using pollard, barley meal, or commercial pig meals.

General Notes.

Canegrowers' Organisations.

An Order in Council and Regulations have now been passed under "*The Primary Producers' Organisation and Marketing Acts*, 1926 *to* 1928" setting out definitely the powers and functions of the Queensland Cane Growers' Council, District Cane Growers' Executives, and Mill Suppliers' Committees.

Banana Beetle Borer—Proclamation Rescinded.

On the 22nd September, 1927, a Proclamation was issued prohibiting the introduction of any banana suckers into the Wolvi district, which was then free from beetle borer infestation. On a petition being received from growers in the Wahpunga district and upon the recommendation of the Wolvi L.P.A., the Proclamation has been rescinded, thus allowing banana suckers to be introduced from outside areas. This prohibition has been lifted on account of the Wolvi district having become infested with beetle borers.

The Royal Society of Queensland.

The ordinary monthly meeting was held in the Geology Theatre on Monday, 30th September, 1929.

The President, Professor J. P. Lowson, M.A., M.D., was in the chair.

Mr. H. J. G. Hines, B.Sc., was elected to ordinary membership.

Professor E. J. Goddard, B.A., D.Sc., delivered a lecture entitled "Science and Agriculture in Java." A vote of thanks was carried on the motion of Dr. W. H. Bryan, M.C., seconded by the President.

Kikuyu Grass in Paspalum Pasture.

Kikuyu grass is a useful plant to work in amongst paspalum, or to plant in ploughed paspalum areas, as it will not only hold its own, but in most cases will choke out the other grass. Kikuyu is more drought resistant, and produces more feed during winter months than paspalum, although it must be remembered that it is primarily a summer grower. It does not form seed, and consequently roots have to be planted.

The best time to plant is during the spring. Where it is impossible to plough the roots in, such as on hillsides or in stony land, use a mattock or hoe, completely burying the roots 1 to 2 inches deep, so as to prevent stock from pulling them out of the ground during the early stages of growth.

The Silent Men.

There are many men of great ability who are not good talkers and the world owes much to them. We read the other day of a director, concerning whom the president said, 'His words are few, but his judgments were wise and influential.' We have known cases where the most voluble members of a committee or board would discuss a matter for hours, but in the end the decision nearly always rested upon the opinion of one or two men slow of speech, but of remarkably sane and well-balanced judgment. The idea that fluency must necessarily mean great mentality is an erroneous one; the thinker is often slow of speech and he is not apt to shine in society. Youth finds it difficult sometimes to realise this, and is apt to pin its faith to the man with the golden tongue, forgetting that intellect and heart are of much greater importance than facility in speech.—The "New Outlook."

The New Pace in Industry.

I am aware that in England we have some factories managed as well as any in the world; but I am afraid it is undoubtedly true that there is in this country a larger mass of cynicism regarding scientific management than there is anywhere else in the world. There is a larger proportion of men in charge of businesses who do not recognise the need for any intellectual preparation for the job of management. There is a larger proportion of people who think that just because a man is his father's son he can manage the business which his father managed. The fact is that the pace of industry is very rapidly increasing, and the standard of efficiency needed for success is rapidly rising. The British are second to none in technical matters, but they have been inclined to neglect the questions of administration and organisation.—Mr. Seebohm Rountree, in the "Yorkshire Post."

When Feeding Sorghum.

Sorghum should not be fed to stock until it comes into head; if fed prior to this stage there is a danger of what is commonly known as sorghum poisoning. The greatest yield of green fodder is obtained when the seed has formed, but is still in the milky stage. At this stage the crop is very palatable and digestible.

Sorghum poisoning is of fairly common occurrence in Australia, and has also been reported from other countries, but it is only necessary to adopt certain precautions to avoid loss. The poisonous substance gradually diminishes as the plants become old, and entirely disappears by the time the seed is formed. Stock should not be allowed to eat young sorghum, especially if it is wilted through hot, dry weather. Stunted sorghum may also cause death, and immature sorghum which has been frosted is dangerous. The mature sorghum is harmless, and can be fed with perfect safety.

A Temperature Tail—The Curl of the Pig's Appendage.

Owners of Berkshire pigs in the United States declare that they can tell when it is going to be a cold windy month by the curl of the pigs' tails. One farmer avers he has forecast weather for years by simply watching the pigs' tails. This is what he says:—

When the tail straightens out, you may depend on colder weather, because the Berkshire is reaching out for the heat. In other words, the Berkshire figures that the longer his tail the more radiation he gets, whereas a tightly curled tail gets the sun only a few hours a day. Naturally when a pig's tail is curled up he is not getting, nor does he need, the warming rays of the sun. I suppose this is the same with other breeds. Take it from me, says the writer, a Berkshire tail works the same as a thermostat. It contracts and expands according to the temperature.

Passion Fruit Yields.

"It is being asserted in some quarters," writes the departmental Fruit Instructor located on the North Coast (New South Wales), "that a yield of 200 bushel cases of passion fruit per acre is a fair average yield under North Coast conditions. This estimate is greatly exaggerated and is, no doubt, based on the fact that some five years ago yields of that quantity were obtained in the Tweed River valley. It is most unreasonable, however, to assume that what can be achieved in that particular district is also possible anywhere on the North Coast, from Kempsey to the Tweed Heads. Moreover, in recent years, brown spot and woodiness have substantially reduced yields, and the grower who to-day is harvesting 140 bushel cases per acre should be satisfied that he is obtaining a fair average crop. Even to obtain that quantity, he will need to have a fair knowledge of proper cultural practices and disease control measures, and, in addition, be favoured with a normal season."

Laymen as Research Workers.

The layman is often deterred from serious application to any branch of science by the length of the road he thinks it will be necessary to travel before becoming qualified for research. If it were essential to master a subject before attempting to contribute to its advancement by original work, none of us could hope to become more than industrious seekers after omniscience within a restricted field, said Professor A. C. Seward, F.R.S., speaking at the annual British Association meeting. Anyone of average intelligence, provided he or she has the driving force born of enthusiasm and the faculty of taking pains, is capable of making valuable contributions to knowledge in some department of scientific inquiry. Amateurs have taken an honourable and productive part in advancing geological and botanical knowledge; they have an advantage over professional teachers in that they are free to concentrate their energies where preference leads them. Moreover, laymen are more fortunate than professional men of science, who are expected to be able to answer all questions relating to the subject they profess, in not being expected to know more than they know.

Scours in Calves—Method of Treatment.

Scours is one of the commonest maladies affecting artificially-reared calves. It is almost always caused by careless feeding—of milk that is too cold, not quite fresh, or contaminated by the oganisms which cause scours, by too large a feed, or by too rapid a change from one class of food to another. Primarily, it is an evidence of indigestion and should be checked before it reaches the stage known as "white scours" or the more dreaded "blood scours."

The best measures to adopt are—

1. Reduce the quantity of milk per feed.
2. Look for the cause of the trouble.
3. Heat milk (for affected animals at least) to a temperature of 180 deg. Fahr. for ten minutes and keep in perfectly clean surroundings.
4. Give the calf about 2 oz. of good castor oil (cold drawn) to remove the corrupt and undigested material from its stomach as soon as possible.

"What Was He Worth?"

"'What was he worth?' is no uncommon question after a man's death, and such a question is a painful tribute to the commercialism of to-day. If a man is worth no more than what he left, he is worth nothing," says the "Expository Times." "A man is worth what he is, not what he has; and that is true both of this world and of that which is to come. While he lives he may win and lose everything but one—his own personality. That is always his: ultimately it is all that is his. In that lies his worth—not in the abundance of the things which he possesses and can lose. And when he dies, he loses what he has, but he remains what he is. He who is unjust will be unjust still; he who is holy will be holy still; but he who is wealthy will be wealthy no more. When a man is said to be worth so much, let us ask, To whom? Who was the better for what he was worth? Was even he himself the better for it, or was he only the richer? Did his presence lighten any darkness, cheer any loneliness? Was any heart the sorer for his passing? Unless he was a worthy man, unless, that is, there was something in him we could worship—for worship is tribute to worth—he was worth nothing, though he had millions. The day is not yet come—will it ever come?—when inner worth is rewarded with its corresponding share of the world's good things, its honour, fame, and gold. There may be some world where worth and wages invariably and accurately correspond, but assuredly it is not ours."

A Story of Steady Progress.

Thus the "Queensland Producer":—The annual report of the Under Secretary for Agriculture (Mr. E. Graham) was tabled in the Legislative Assembly recently. Mr. Graham is to be congratulated upon the comprehensive review of the State's primary industries.

Mr. Graham makes no extravagant statements regarding Queensland's primary production. He indicates the steady progress that has been made in the various sections of agricultural industries.

The wheat yield showed a decrease on the previous year; sugar-cane production was well maintained; cotton showed a decrease due to the uncertainty as to the attitude of the Federal Government towards the industry; butter production was a record—a tribute to the magnificent work performed by the co-operative associations and the efficient organisation of the marketing end of the industry; steady progress has been maintained in the pig industry; the rapid expansion of the poultry industry has been maintained.

One feature of the year's operations was the improvement in the quality of fruit. There was a decrease in the number of cattle and horses, and an increase in the number of sheep.

Mr. Graham's story is one of steady progress, and indicates the wide range of Queensland's agricultural production.

Blowfly Trouble in the Central West.

The Minister for Agriculture and Stock, Mr. H. F. Walker, M.L.A., informed the Press recently that upon his being advised of a serious outbreak of blowfly attack in the Central West, he had arranged that Mr. J. Carew, Senior Instructor in Sheep and Wool, should investigate the methods adopted by pastoralists in combating this pest, and also to advise, in all necessary cases, as to the best way of dealing with it.

Mr. Carew spent some time in the Western country and discussed with a number of pastoralists their methods of combating the difficulty. Some flock owners picked out all affected sheep for treatment. This treatment consisted of crutching, cleaning, and swabbing the infected parts. The remainder of the flock were then jetted with a proprietary powder dip used in liquid form.

In one instance, Mr. Carew inspected ewes that had been jetted four weeks previously with this mixture, at the rate of two packets to fifty gallons of water, applied by power at a pressure of about 150 lb. to the square inch. The ewes had been crutched in May, and no stricken sheep were noticeable in this particular flock.

Generally, Mr. Carew found that jetting gives more protection than, probably, any other method, provided that the mixture is sufficiently strong and properly applied with enough force to reach the skin. The real jetting objective is to ensure that the fluid reaches the base of the wool fibre and the skin. It was found that in some cases where this contact was not effected the jetting fluid did not penetrate to the parts most likely to be affected by fly.

Both in the Longreach and Barcaldine districts it appeared that the intensity of the attack had abated, and that the owners generally were getting the pest well under control, although some sheep had been lost.

Millet as a Catch Crop.

Millet is perhaps the quickest growing of all plants cultivated on the farm, provided it finds suitable weather conditions, and its utility as a catch crop is becoming increasingly recognised.

Millet may be grown for hay, green fodder, or to be fed off by stock—it is useful for feeding to all classes of stock and poultry. The crop may be fed off green, and then allowed to produce growth for hay. Where it is fed off the stubble should be harrowed to loosen the soil and conserve the moisture, and in this manner a good second growth is usually obtained. Owing to its sturdy habit, millet has been found a splendid crop to grow on foul land to get rid of the weeds.

The most useful varieties are Japanese, Hungarian, Manchurian (white and yellow), White French, and Pearl, and of these Japanese is by far the most grown. Japanese is about the best stooler of all the millets; Hungarian is useful as a hay variety, but is not a good stooler and will not stand a dry weather pinch like Japanese; while where grain is required the Manchurian varieties will be found the most prolific.

Millet obtains its nourishment chiefly from the surface soil, and it is good farm practice to stimulate the growth with readily assimilable fertilisers or rotted farm manure; the fertilisers are best harrowed in, and the farmyard manure applied before ploughing.

From 8 lb. to 12 lb. seed per acre is required, according to the fertility of the land. Broadcasting is the usual method of sowing, but for grain production or silage drilling is advantageous. Where possible, sowing should be carried out after rains or when the soil is moist, to give the crop a start.

Water for Bees.

The bee-farmer should generally endeavour, when selecting a site for his apiary, to get near a permanent water supply, for bees require an ample supply of good water, especially during the hot weather. If there is neglect in making provision for water near the apiary, there is considerable wastage of energy on the part of the bees in searching for a supply, and in carrying it a long distance.

It is not a very difficult matter to provide a water supply even if containers have to be used. A container offering a good surface of water is preferable, and cork floats can be put in the vessel to prevent the bees from being drowned. Another method is to bank sand in each side of the vessel, and place a cover over the water, which is in the centre; the bees will obtain the water from the moist sand. It is important that the water supply be kept fresh. A supply of water in the apiary grounds is especially advisable where bees are kept in towns, so as to get the bees into the habit of obtaining water at home, and not searching about the neighbourhood for a supply.

There are many points to be considered in starting an apiary, particularly when bee-keeping is to be carried out on commercial lines. As in other activities, the start is all-important. Five well-hived colonies containing a fair breed of bees will, with ordinary attention, equal thirty of the "kept any way" sort, so far as production is concerned. It is quality, not number, that counts; and the beginner's first aim should be to keep bees the right way.

A very comfortable living can be made from apiculture, providing the apiarist will properly qualify himself to become a producer. The three main things are experience, locality, and energy. Small apiaries can be profitably worked as a side-line with other industries, providing time can be found for ordinary attention during the season.

Music in the Air.

A series of tests with the most modern creations of radio engineering from all parts of the world have been carried out by the principals of Paling and Co., of Queen street, Brisbane, in an endeavour to obtain radio sets that may be relied on to give best performance and utmost satisfaction. The result of this extensive research has been to bring Majestic and Victoradio to Queensland, Palings, of course, being Queensland agents. From every angle Majestic and Victoradio are said to represent the last word in radio design and construction. The cabinet work on all models is most artistic, the finish to all appearances perfect and the reproduction practically faultless. Both electric and battery sets are included, and, perhaps, the most interesting of all are the combination radio sets and phonographs—both Majestic and Victor. As radio sets they are very powerful and being equipped with the latest type of dynamic speakers, bring in all Australian programmes—including short wave stations —with unusual clarity and purity of tone. As far as the phonograph is concerned, one has only to play one record to realise that it is a machine of special quality. A button on the front of the instrument controls both the volume for the radio and phonograph, and, especially when the phonograph only is being played, results in a class of reproduction one rarely hears.

Both these combination instruments are beautifully designed, and being finished in perfectly matched walnut or mahogony, have the appearance of excellent pieces of furniture that would find a place in any drawing-room, no matter how elaborately furnished. Other Majestic and Victor models are also beautifully made and most efficient.

Marketing of Tomatoes.

Some time ago notice was given by the Committee of Direction of its intention to issue a Direction for the marketing of tomatoes. As a consequence, a petition was received asking for a ballot to decide whether or not such Direction should operate, and Regulations under the Fruit Marketing Organisation Acts were issued on the 31st August last, describing the procedure which should be adopted in the holding of the necessary ballot. Those entitled to vote were any growers of tomatoes within the District bordered on the north by Nambour, on the west by Rosewood, on the south by the New South Wales border, and on the east by the Pacific Ocean. The grower had to declare that he expected to have tomatoes for sale on a wholesale basis between the 15th September and 15th December, 1929. The Direction the growers had to vote on was:—

(*a*) All tomatoes to which the Direction applies shall be subject to inspection by the Committee;

(*b*) All mature tomatoes may be marketed by the growers;

(*c*) Tomatoes which are not mature may be diverted by the Committee to the factories; and

(*d*) All tomatoes are to be dealt with and handled by the loaders of the Committee of Direction, but this did not mean that all tomatoes would be sold by the Committee.

Briefly the object of the Direction is to deal with immature tomatoes, the intention being that growers themselves should be able to market mature fruit.

The poll was duly conducted and the result was that 147 voted for the Direction and 85 voted against. As this was more than the three-fifths majority required under the Act, the proposed control became operative.

Australian Wildflowers.

In view of the recent discussion on the ways and means of stimulating interest in Australian native flora, it is pleasant to note among the publications of the Shell Oil Company an attractive brochure on Australian Wildflowers, "issued gratis to the motoring public of the Commonwealth."

In the preface of this little book is expressed the desire of the company to stimulate public interest in our abundant natural flora. Although there are technical works on the subject for the botanist and many delightful reproductions of specimens on canvas, the need has long been felt for some non-technical descriptive work that may be both interesting and instructive to the general public, and may serve at the same time as a practical handbook to those who, taking trips into the country or living there, have the opportunity of studying the flora first hand.

Authoritative information on the parts of the country where the different varieties of flowers may be found is given in the small volume which contains some fine coloured plates of popular favourites.

More important still is the direct appeal it makes to the public to protect the wildflowers of this country. The need of such an appeal has been increasingly felt with the wanton destruction so much in evidence each season in the nearer country districts.

The Victorian Government Pomologist, Mr. E. E. Pescott, speaking at the Constitutional Club on 16th August, 1929, called attention to the manner in which Australian flora is slowly but surely disappearing.

By this publication the Shell Oil Company is helping to stimulate a greater public pride in the beauty of the countryside—especially so in view of its free distribution. The motorist, on applying for the book, should send in with his application to the Shell Company the registration number of his car.

Cleanliness in the Milking Shed.

Absolute cleanliness in connection with the operation of milking is of the greatest importance. The cow having been bailed or tied up, the milker should wipe the udder with a damp cloth; this is preferable to brushing, which only causes the dirt to float in the atmosphere and subsequently to drop into the milk bucket. A separate cloth should be used by each milker, and should be kept thoroughly clean and sweet—a smelly cloth is a source of contamination.

Where gravitation water is not available, a good plan is to have, say, two oil drums, into each of which is fixed a small tap. These drums should be fixed to the posts or walls and filled up with water, a system thus being installed that allows the milker to have clean water in which to wash his or her hands. Very often one finds basins of water used, but as this is probably not changed during the whole milking operation it becomes a thick soup containing myriads of organisms, and therefore a source of contamination instead of benefit. After the milking of each cow the milker should wash his hands in clean water, and dry them; if this is not done there may be bacteria in the liquid on the hands that will gain access to the milk in the bucket.

Dry milking versus wet milking is often a debated point, but the practice of drawing a little milk into the bucket and dipping the fingers therein is undoubtedly most insanitary. A good plan is to touch each teat with a little vaseline, which prevents friction, and also prevents cracks on the teats.

Any time occupied in washing the hands is made up eventually by reason of the water's invigorating effect on the hands and wrists of the milker. Moreover, as every dairyman knows, the more actively the milking is done the more the activity of the milk-secreting cells is stimulated, hence more milk of better quality. Clean milking also tends to lessen the risk of transmitting disease from cow to cow.

Not only should every process in connection with the milk itself be cleanly, but cow-bails should be so constructed as to allow of easy cleansing, and should be frequently lime-washed as well as cleaned daily.

Staff Changes and Appointments.

Mr. G. Bates has been appointed Field Assistant, Bureau of Sugar Experiment Stations, Department of Agriculture and Stock.

Constable C. F. Robson, of Mitchell, has been appointed an Acting Inspector under the Diseases in Stock Act as from the 19th October, 1929.

Mr. S. C. Allan, of Cloncurry, has been appointed an Inspector under the Brands Act of 1915.

Messrs. H. W. Kerr and E. J. R. Barke have been appointed Inspectors under the Fertilisers Acts.

Constable V. B. Saal, of Tannymorel, has been appointed an Inspector under the Slaughtering Act.

Mr. J. P. Ward, Clerk, Agricultural Bank, has been appointed an Inspector, Agricultural Bank as from the 2nd October, 1929.

Mr. S. R. Frankcom, of Tamaree, has been appointed an Honorary Inspector under the Diseases in Plants Acts, as from the 26th October, 1929, vice Mr. T. Jones, resigned.

Mr. J. C. Pryde has been appointed a Temporary Inspector under and for the purposes of the Diseases in Stock Act for a further period from 29th September to 2nd November, 1929.

Mr. P. J. Short has been appointed a Temporary Inspector under and for the purposes of the Diseases in Stock Act for the period from 12th November to 12th December, 1929.

Mr. J. H. Smith M.Sc. (Agric.), Assistant Entomologist, Cairns, has now been appointed Entomologist, Department of Agriculture and Stock, and Mr. W. A. T. Summerville, B.Sc., Assistant to Entomologist, Brisbane, has been appointed Assistant Entomologist, Department of Agriculture and Stock.

Mr. W. B. Horneman, Inspector under the Dairy Produce Act, at present attached to Nanango, has been transferred to Rosewood; Mr. E. R. Boyd, Inspector under the Dairy Produce Act, has been attached to the Nanango district; Mr. A. Hossack, Inspector under the Dairy Produce Act, at present attached to the Herd Testing Staff, Brisbane, has been transferred to Gatton; and Mr. S. E. Pegg, Inspector under the Dairy Produce Act, has been attached to the Herd Testing Staff.

Wheat on the Downs.

The Minister for Agriculture (Hon. H. F. Walker) has received from Mr. J. J. Kemp, a well known farmer of Junabee, a statement regarding the prospects of wheat growing on the Darling Downs, from which the following note is taken:—

> "I have no hesitation in saying that wheat can be grown successfully on the Downs, as I have been growing wheat over thirty years, and during that time have had only one failure, that was in 1901-2. In normal years we get a return of 8 to 10 bags per acre, good years to 13 bags. In 1916, which was a very dry year, on ground that was fallowed we got a return of 8 bags per acre; that proves if fallowing were done more extensively that there would be no failures of wheat. In 1923, another dry year with no fallow, we got a return of 16 bushels per acre. In 1926, a drought year, we had to feed most of the crop to stock and we got 12 bushels from what we harvested. My experience is to work the ground as early as possible after taking off the crop so as to conserve as much moisture as possible for the next crop. No use taking plough in the paddock when the drill should be there, as it is only courting a poor crop or failure. We have as good wheat land as can be found anywhere. All it wants is working early and well to give a good return. If this were done I venture to say that there would be few failures in regard to growing wheat."

Commenting on this Mr. Walker remarked that as indicative of the confidence which results from stability and mutual agreement between those concerned in industry, he had received an intimation from one of the country millers of his willingness to erect substantial stores at his mill entirely at his own expense, conditional on a small area of Crown land controlled by the Railway Department being made available to him for this purpose. The miller in question offered to have these stores erected immediately, and if possible, in time for the safe housing and storing of portion of the coming season's crop. Mr. Walker added that he was looking into the matter with the Department concerned. Obviously it would be preferable to house as large a proportion of the crop as possible in modern stores rather than to sustain losses through mice or weather damage.

The Fencing Job.

In the days when fencing timber was plentiful, posts were usually placed about 10 feet apart, and experience has shown that the most efficient fences are those with panels of about that width. The increasing scarcity of suitable timber, however, together with much higher labour costs, have in recent years compelled landholders to exercise greater economy in the use of posts, and the panels now are of much greater width; in extreme cases posts are as much as a chain apart.

In erecting a fence, however, efficiency must be taken into consideration as well as cost, and it is very bad economy to endeavour to save a little on the original cost by reducing the number of posts if the result means higher costs of maintenance or a fence that will not give the desired protection. Serious loss may occur through weak fences. The loss consequent upon several valuable working horses breaking through a weak fence on to ripe wheat, for instance, may be much greater than the saving effected in the erection of the fence.

While, however, it has been found that the strongest fences are those with panels of from 10 to 12 feet, experience has also shown that fences strong enough to resist all reasonable strains can be erected with panels of much greater width, provided suitable droppers are used. The extra cost involved in erecting a fence with narrow panels where fencing timber is expensive or difficult to obtain is therefore not always justified. In general, if posts are comparatively cheap and plentiful, panels can be made about 12 feet apart, but where posts are not easily obtainable the panels should be made wider, and droppers used instead. A suitable width for a panel is then 22 feet.

The chief points to be considered in selecting timber for fencing—though the choice will of course be limited by the kinds available in the vicinity of the area to be fenced—are strength and resistance to decay and to the attacks of white ants, and also to fire. Size is also an important consideration, though this depends on the kind of timber used, and upon the age of the tree from which the posts are cut; as a rule small trees are sappy and decay quickly. The most desirable size for posts is about 8 inches by 4 inches; they are then strong and usually durable. Some kinds of trees, however—notably, the buddah of the western country—are extremely durable and strong, and posts of 4 inches to 5 inches diameter are quite satisfactory.

Profit in Pigs—Excellent Weights.

Discussing the weights attained by the first and second prize litters in the large Yorkshire section at the recent Melbourne Show, Messrs. Fairchild and Clutterbuck, whose stud is at Tinamba, Victoria, stated that they devoted a great deal of care and attention to the preparation of these pigs and spared no effort to place them before the Judge in the very best form possible. The litters and the sows, too, were shown to perfection and were as pretty as paint, and considerably more profitable.

The weights of these show litters of large white pigs (that is, large Yorkshires) at sixty-two days old were—

	Name of Dam. "Vaucluse Vanity"	Name of Dam. "Vaucluse Venus"
Pig Marked in Ear No.	373 boar 78 lb.	381 boar 68 lb.
	374 boar 75 lb.	382 boar 72 lb.
	375 boar 71 lb.	383 boar 59 lb.
	376 boar 68 lb.	384 sow 59 lb.
	377 sow 64 lb.	385 sow 69 lb.
	378 sow 71 lb.	386 sow 66 lb.
	379 sow 73 lb.	387 sow 73 lb.
	380 sow 61 lb.	388 sow 65 lb.
	—	389 sow 64 lb.
	Total 561 lb.	Total 595 lb.
	Average 70.12 lb.	Average 66.11 lb.

Their feed was comprised of crushed barley, crushed wheat, pollard, linseed meal, bone meal, and skim milk, with the addition of all necessary minerals, and ¾oz. of cod liver oil daily per pig. The feed was supplied three times daily in the form of a slop. Of course green feed was at all times available and they were allowed any amount of exercise.

These pigs were all tattooed in the ears at five weeks old and the tattoo marks were as clear and distinct as if they had actually been painted on. It would be interesting to have records of the weights attained by other pigs of this or other breeds, and these, if certified to, will be given publicity in these columns as opportunity offers.

Weed, Breed, and Feed.

The requirements for herd improvement may be put into three words—*weed*, *breed*, and *feed*. The first step to weeding, or culling, is herd recording, in order to discover the "boarders" among the cows, and with respect to breed also the joining of a herd-recording unit is helpful, for although a sire that is able to beget heifers that will be high producers of milk and fat is cheap at a great many guineas, his purchase may be impossible to an individual farmer. An association of farmers, on the other hand, as in a herd-recording unit, will find such a purchase possible. As to feed, it would be impossible to lay too much stress upon it in relation to production, and though the commercial factor must not, of course, be lost sight of, by means of recording the dairy farmer in eventually in possession of a herd well worthy of good feeding.

Herd recording is the recording of each cow in a herd systematically over a lengthened period to ascertain its annual yield in milk and butter-fat, at the same time setting down, not only this production, but all factors that influence it—writing each cow's history and putting it in a card index. No business can be carried on without bookkeeping—the more departments there are, the more urgent is the need for a complete system of accountancy, otherwise effort is wasted, profit disappears, and no progress is made. The average dairy-farmer has forty to fifty departments in his business in the herd alone—each animal is a separate entity.

But an accountancy system will not by itself make for success in any enterprise: it is but a guide and help to the management. Building up production in dairy herds in this is like any other business. Recording by itself is not the cure-all of the average farmer's present precarious position—it can only point out the results of his methods and the merits of his stock under his system of management. He may have cows that under good conditions would be high producers, but because of faulty management, such as bad feeding, ill-usage, &c., they are unprofitable. The production record shows this and stresses the lesson never to condemn an animal until it has had a fair chance to prove itself. By watching results one learns the value of feeding fully and regularly, never to waste the surplus fodder of a good season, nor to allow stock to go half starved in the winter or in dry spells.

Loss through neglect to make provision for feed—not only against those periods of acute scarcity which occur occasionally but also to supplement the natural pastures during those short periods of scarcity which occur at one period or another every year —constitutes a heavy charge on dairying. Growing of fodder crops, conservation of fodder in the form of silage, and improvement of the natural pasture by top-dressing and the sowing of grasses are all important as means of reducing such losses.

Importation of Pedigreed Stock.

The Minister of Agriculture and Stock, Mr. H. F. Walker, has been advised officially that the Federal Government has agreed to co-operate with the respective State Governments, the Empire Marketing Board, and the shipping companies in the defraying of the freight incurred on the importation of pedigreed stock from the United Kingdom. The class of stock to which this concession will apply comprises approved registered pedigreed stud cattle, sheep, and swine. The details of the scheme are:—

1. The following proposals shall apply in connection with the transport of approved registered pedigree stud cattle, sheep, and swine from the United Kingdom to Australia.

2. All other incidental expenses connected with the transport of the stock from the port of export in Great Britain to the port of importation in Australia, such as provision of stalls, cost of water, fodder, quarantine charges, and attendance during the voyage, to be borne as follows:—

(i.) One-third by the purchaser.
(ii.) One-third by the Commonwealth and State Government concerned in equal proportions.
(iii.) One-third by the Empire Marketing Board.

3. Where assistance is granted to any breeder, he shall not dispose of the stock within two years of the date of its importation, and should it be necessary for him to sell during that period, the amount of any assistance granted to him shall be refunded.

4. The purchaser to insure any animal imported to place of destination and for one year thereafter. Special insurance to be effected to cover quarantine. In case of total loss, purchaser to replace the animal by importation from the United Kingdom or refund all assistance granted from Government sources under the scheme.

5. Scheme to operate for two years from 1st October, 1929.

Those desirous of taking advantage of the scheme should make application to the Under Secretary, Department of Agriculture and Stock, Brisbane, giving full particulars of the class of stock they wish to import, and obtain the approval of the Minister. In the event of approval by the Minister to the transaction the shipping companies will then be advised and the necessary arrangements will be adjusted on the basis of the terms set out.

How to Cure a Hide.

A clean, well-cured, good-shaped hide, free from scores, cuts, blemishes, and slip will fetch top values, but there is a heavy annual loss due to neglect with regard to the above-mentioned points. The following directions for the curing of cattle hides are given in a recently published departmental pamphlet:—

The hide must be kept clean of blood, dirt, manure, or other debris, and allowed to cool. It should be laid out in a clean place, and liberally and evenly sprinkled with coarse salt. The quantity necessary is about 18 lb. per hide. The legs, neck, and edges of the hide require special attention, as they are the first to show the effects of bad salting. If the hide is to be disposed of at once, it should then be folded by throwing the sides over the centre, then the neck and tail-end again folded over, and rolled up into a bundle and tied with thin rope or stout twine. Wire should never be used, as it will eventually stain the hide. Efficient, clean, and quick salting is necessary to prevent the hide from turning more or less putrid. Putrefaction causes the hair to fall or slip, and "slippy" hides are frequently not worth tanning.

If it is intended to store the hides to make one large consignment they should be cleaned, and when the animal heat has escaped, placed on a clean floor which has been sprinkled with coarse salt. The hide should be laid down, fleshy side up, and sprinkled evenly with clean coarse salt. The next hide may be laid on top of the previous one and salted similarly. After being salted for a fortnight or longer they can be folded ready for sale and firmly tied with thin rope. Before bundling, any superfluous salt should be shaken or swept off.

If it is intended to keep skins on hand for any length of time it will be necessary to spray or paint them with an arsenical preparation in order to prevent the ravages of weevils or other vermin. A satisfactory spray can be made by adding 1 lb. arsenic and 3 lb. soda to 5 gallons of water and then boiling the mixture; when dissolved make up to 15 gallons of water. If preferred, arsenate of soda, procurable at most country stores, may be used in the strength of 1 lb. to 5 gallons of water. Another preparation can be made in the following way:—Dissolve 1 lb. arsenate of soda in 5 gallons of cold water; place 1 lb. bitter aloes in 2 gallons of water and boil until the aloes are properly dissolved, and add 1 pint of the aloes mixture to every 5 gallons of the arsenate of soda mixture. The spray is then ready for use.

Any preparation should, of course, be painted on the fleshy side of the skin.

Calfskins may be treated and folded in the same way as cattle hides. Two or three or more may be folded together to make a fair-sized bundle, and tied firmly together with strong twine or thin rope.

Inefficient curing and the dirty and stained condition in which hides and skins are often marketed do much to depreciate their value. Carelessness in these respects, together with faulty methods of flaying the skins of cattle and sheep and excessive branding of cattle and calves, is responsible for reduced returns to consignors, other causes of depreciation of the quality of the product being cuts and score-marks received by the living animal through horning, contact with barbed-wire, and other external injuries.

Poddies or Pigs?

Which pays the better—to devote the skim milk available on the dairy farm to the rearing of calves or to the feeding of pigs? In the opinion of many dairy farmers the pig is much the more profitable proposition.

Discussing this question in an address referred to some time ago in these notes, one South Coast farmer observed that one could not help noticing the enormous quantity of skim milk that was somewhat aimlessly fed to calves each year. If the trouble were taken to follow these calves to their ultimate exit from the district, it would probably be found that they were bought for stocking districts where farmers considered it more profitable to raise pigs, and to buy their calves from the districts where the farmers had never taken the trouble to sit down and think things out a little more thoroughly. No sound reason existed for farmers in that district raising more than 15 per cent. of the herd in female calves each year in order to replace ordinary depreciation of dairy herds. If all male calves and all female calves not required for replenishing herds were destroyed and the skim milk fed to pigs, South Coast farmers would, in the speaker's opinion, be in a much better financial position.

The same view was expressed by Mr. J. Alcock, at the recent State conference of the New South Wales Agricultural Bureau. The time had arrived for the greatest economy in every detail connected with dairy farming, said the speaker, and the loss on calves constituted one of the great leakages. Advancing the case of the pig as against the calf, Mr. Alcock compared the costs involved in rearing in relation to the value of the products.

When the calf was, say, five days old, it had a cash value of about 5s. 6d. (4s. 6d. for the hide and 1s. for the carcase as pig feed). For the first two weeks it was fed 1 gallon of sweet milk daily, the third week it was fed ½ gallon of sweet milk and ½ gallon of separated milk daily, the fourth week it was fed ¼ gallon sweet milk and ¾ gallon separated milk, for the next ten week 1½ gallons separated milk, and for the following thirteen weeks 2 gallons. This made a total of £2 10s. 2d. for feed alone, or, adding the value of the calf, a grand total of £2 15s. 8d. This calf was worth only 30s. to 35s. on any market; in fact, he had seen them sold for 10s. a head. At the present time choice lines of Jersey heifers were changing hands at under £3, and these would average nine to twelve months old.

Suppose, on the other hand, a farmer were to buy a sow near farrowing for £8. The cost of feeding would be that of a gallon of separated milk plus 3 lb. grain daily for two months, or £1 12s. 8d., making a total (with the £8 for the cost of the sow) of £9 12s. 8d. He would assume that the sow produced nine pigs, which was only an ordinary litter. The sow was then worth, say, £4 10s. without the pigs, leaving the value of the nine pigs at £5 2s. 8d., or 11s. 5d. each. The ration for these pigs for the third month was 28 gallons of separated milk, plus 48 lb. grain, for the fourth month it was 45 gallons separated milk and 60 lb. grain, and for the fifth month it was 45 gallons of separated milk and 70 lb. grain. This made the total cost of the pigs £2 5s. 11d. A pig of this age and fed on the ration described, with pasture in addition, should weigh at least 120 lb. dressed weight, and the average price for this class of pig was £3 10s.

Thus, said the speaker, the pig showed a profit of £1 4s. 1d. and the poddy a loss of at least £1. He had charged nothing for pasture for either, but the balance would still be in favour of the pig.

The Home and the Garden.

OUR BABIES.

Under this heading a series of short articles by the Medical and Nursing Staff of the Queensland Baby Clinics, dealing with the welfare and care of babies, has been planned in the hope of maintaining their health, increasing their happiness, and decreasing the number of avoidable cases of infant mortality.

SAVE THE BABIES.

A Season of Danger for the Infant.

The hot season is coming. Probably more babies will die during the next three months than during any other three months of the year. It is (though it should not be) the dangerous season for babies. They will die of an infectious and preventable disease. Save the babies!

Last year 112 babies under one year died in Queensland of this disease; the year before 214 died—nearly twice as many. Have our Baby Clinics doubled the efficiency of their work in the past year? Are our Queensland mothers twice as wise? We wish it were so. A part of the decrease may be due to better mothercraft. Most of it was due to good luck. Possibly this year we may have bad luck. The summer before last Rockhampton suffered from a summer epidemic which killed fifty-one babies under two years of age in three months. This season some other town may be threatened by a similar epidemic. Shall we trust our infants' lives to luck, to chance, to fortune? Save the babies!

Summer diarrhœa, dysentery, gastro-enteritis, by whatever name you like to call it, is an infectious disease. It is caused by dysentery bacilli, which are carried about by flies. It is not caused directly by hot weather. Nor has the Jacaranda, which happens to flower at this time of year, anything to do with it. The infection is never present in freshly boiled or scalded milk, for boiling kills dysentery bacilli. If the milk was stale and dirty before boiling, it will give babies simple diarrhœa; it cannot give them dysentery. The milk may be infected after boiling, so may any kind of artificial food, so may the baby's bottles, teats, and dummies. Those who sell dried milks or patent foods may suggest that in them lies perfect safety. It is not true! Foolish beliefs put into mothers' heads are paid for in infants' lives. Save the babies!

Natural Food for the Young Australian.

Save your babies by giving them their natural food—the only food which is perfectly clean, fresh, and safe. Never wean a baby during the next three months if you can possibly help it. If you must wean it, or if it has been weaned already, exercise the utmost care. Scald the milk, scald the bottles, scald the teats, then keep them most carefully covered from flies. Every single fly may carry death for your babe, or, failing death, an anxious, painful, and enfeebling disease. The strongest and finest baby may die of it. Nothing can make the dummy safe. It is a perpetual attraction to flies. Burn it. You may think that the dummy keeps your baby from crying and makes him happier. You are mistaken; but even if you are right, it is better that some babies should cry a little than that one healthy baby should die of dysentery. Be warned in time. Save the babies!

The Responsibility of Local Authorities.

And you Municipal and Shire Councillors, you are partly responsible. The flies get most of their dysentery bacilli from your closet pans. No doubt you have excellent Regulations to prevent flies from getting access to these pans. Do you enforce those Regulations? Have you sufficient and efficient Inspectors? Do you prosecute? Unless you prosecute a few careless people, your Regulations are useless. Save the Babies!

A dead certainty

HOUSEWIVES the world over are in ever-increasing numbers turning to FLY-TOX as the guardian of Health, Comfort, and Hygienic Cleanliness. Its searching spray brings instant death to all verminous and disease carrying insects.

Its use ensures food being free from fly-contamination, and long, restful nights, immune from the exasperating bites of the dangerous mosquito.

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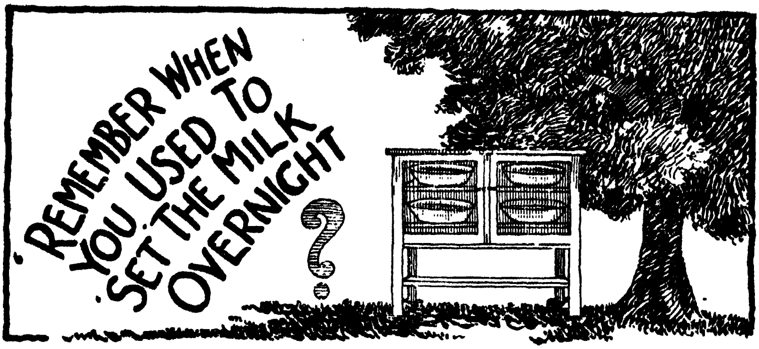
"REMEMBER WHEN YOU USED TO SET THE MILK OVERNIGHT?

MANY a pound of Cream has been Hand Skimmed from Milk set over-night in the big white safe in the shade of the "Mulberry." And there's many a pound of Cream that's been MISSED by the same process. Hand Skimming results in less Cream —less Cream results in less Butter—less Butter results in less Money. The day of hand skimming is over. Farmers realise the advantages of the—

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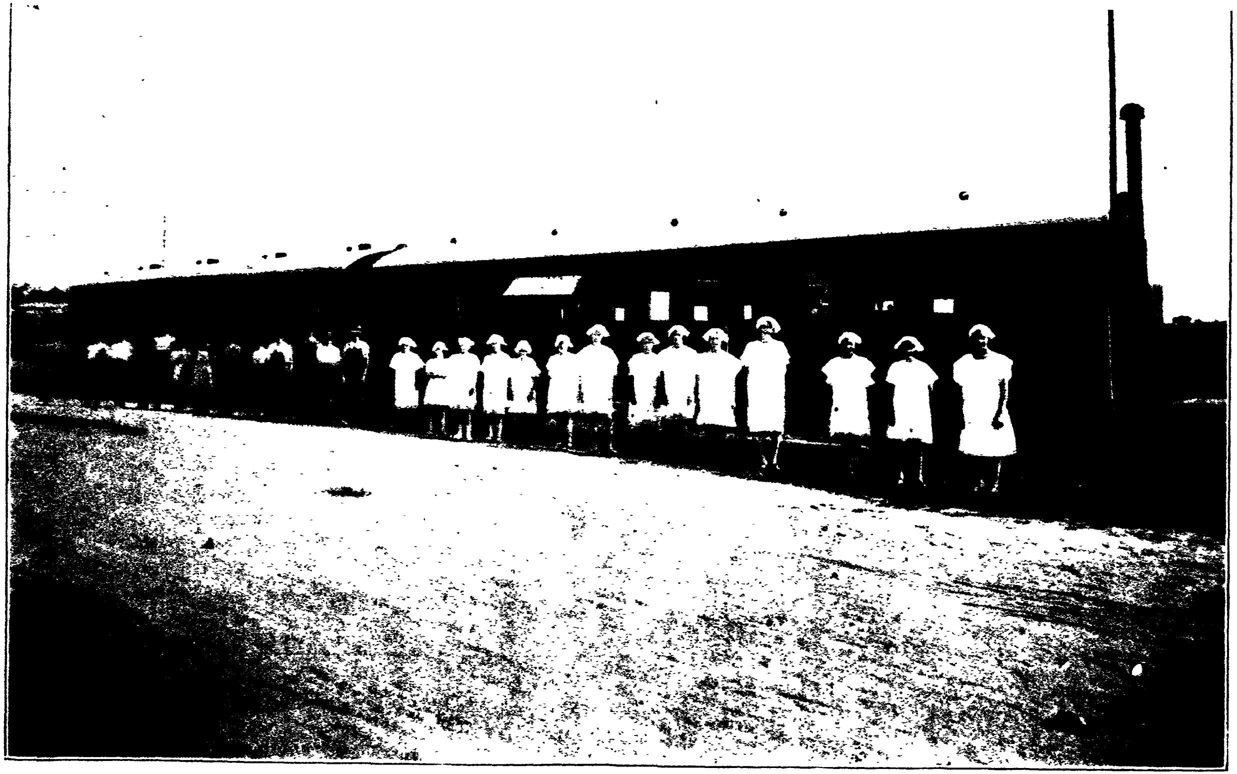


Photo.: Dept. of Public Instruction.]

PLATE 190.—A TRAVELLING DOMESTIC SCIENCE SCHOOL IN QUEENSLAND. A MUSTER OF SCHOLARS AT HERBERTON, NORTH QUEENSLAND.

There are very few schools in the State having an attendance of twenty girls over the age of twelve years for which provision is not made for Domestic Science Instruction. Even in very sparsely settled districts the travelling schools have been able to do very efficient work.

Keep Cool.

We do not say that every mother who does her very best will never lose her baby. That would not be fair nor true. There is no perfect safety for anyone in this world. But we do say that such cases will be very rare. There is no need, nor excuse, for foolish panic. Keep cool. Be very careful. Try not to make a single mistake. If you are in any difficulty, consult the Nurse at the Baby Clinic. She is always willing and anxious to help. If you live too far off, ask for a copy of the Queensland Mother's Book. It will be sent on application. Read it carefully. The lives of our Queensland babies are in the hands of our Queensland mothers. Resolve that this summer you will do your very best, God helping you. SAVE THE BABIES!

A CURIOUS INCIDENT.

There was, I am informed, a large gathering at the annual meeting of the Creche and Kindergarten. There is no institution in Brisbane that does more excellent and more delightful work than this. The best work is often least known, and it may therefore be assumed that this meeting was at least as well informed, and probably better, in child welfare as the general community. Just as some twenty years ago I heard the president of a medical congress declare that every child had its character formed at five years of age—a statement which then to me appeared startling—so at this meeting one of the speakers emphasised the importance of educating children between two and five years of age. A following speaker thought that education might begin a little earlier, perhaps at eighteen months, and appealed to the holder of the Chair of Philosophy at our University for his opinion. The Professor at once accepted the challenge, and said he thought it should commence at the first day; whereat the audience laughed, indeed their merriment was great and general. The unexpected, the incongruity, philosophers tell us, is closely allied to the ludicrous, and here were two unexpecteds—the absurdity of the opinion expressed, and the source from which it came. The Professor had made a joke!

No Joke.

But the Professor had made no joke. He had simply stated, what everyone ought to know. If he had said that the first thing a baby does is to breathe and cry, or that the first thing done to it is to put it in a bath, no one would have laughed. There are some who maintain that wherever there is life there is in some sense mind; an opinion which it is equally impossible to confirm or to refute. If it is not so, when and where does mind begin? Most of our knowledge is conjecture, and the commonest things are the profoundest mysteries. But it is certain that the new-born infant has some sort of a mind, for it can be taught bad habits, and those bad habits are strongly tinged with emotion. The experiment is frequently made, and is often successful. There is no need to repeat it. What is capable of bad must also be capable of good. Certainly the new-born infant should be taught good habits.

The Baby's Good Habits.

What are the good habits it may be taught? Firstly that of regularity, to take nourishment at the proper times, to sleep at the right periods, and so of all its bodily functions. Second, to exert itself when necessary, in other words to commence to work for its living, to co-operate at feeding time, not to have food passively poured into it from a bottle, nor to over-exert itself and clumsily swallow air, distending its stomach to its own great discomfort. Thirdly, it has to be taught confidence, trust, faith in its environment, by which we mean its mother. The babe that finds this environment irregular, untrustworthy, or spasmodic is not a happy babe. And so, fifthly, it has to be taught contentment, that state of serenity which only in infants, and sometimes in the very old, ripens into blessedness. Are not these important lessons? Need we argue the matter any further?

Laughter is good for body and mind. It is specially refreshing at public meetings. We hope that those who were present at this meeting will now have a quiet laugh at themselves, for not immediately recognising as a simple truth that which should be known by every woman and every father.

VEGETABLES.

Vegetables will require constant attention next month, particularly in the Granite Belt area. Tomatoes and potatoes should be carefully watched in order to prevent loss from Irish blight, and no time should be lost in spraying these crops should this disease make its appearance in any part of the district, as it can be prevented by spraying with either Bordeaux or Burgundy mixture. These fungicides effectually protect the plants to which they are applied if used in time. If leaf-eating insects, such as beetles, grasshoppers, and caterpillars, are doing damage as well, add 3 or 4 lb. of arsenate of lead to the 100 gallons of spraying mixture used for the prevention of early and late blight (potato macrosporium and Irish blight), so that the one application will be effectual for both classes of diseases.

Keep all kinds of vegetables well worked, stirring the land frequently to retain moisture, and taking care to prevent the formation of a surface crust should rain fall. Remember that vegetables require plenty of moisture; therefore leave nothing to chance, but do your best to retain all the moisture in the soil you possibly can.

THE COMPOST HEAP.

The compost heap is a valuable adjunct to the farm, and especially on small areas, where some intensive form of agriculture, such as vegetable growing, is being carried out. A heap or pit can be made very economically. It utilises all sorts of vegetable and animal refuse which would otherwise be wasted, and converts it into a valuable manure, rich in vegetable matter and eminently suited for soils low in humus or subject to droughty conditions.

The principle of the compost heap is the fermentation of easily decomposed vegetable matter in the presence of earth and lime. Not only are substances like peat and straw, which form the usual basis of compost heaps, thus decomposable, but almost every kind of organic substance, both of vegetable and animal origin, can be composted. Dead leaves, bush scrapings, sawdust, weeds, tops and stalks of vegetables, as well as bone and animal refuse can be treated in this manner. In the case of animal refuse the operation is much slower, and substances like bone should be first crushed. It is also important to be sure that animal refuse so treated is not derived from a diseased source.

The best way of making and maintaining the compost heap will depend largely upon local surroundings. As a general method of procedure the following will be found satisfactory. Make a heap with alternate layers of earth, refuse, and lime. Under the term refuse is included all the refuse material of animal or vegetable origin mentioned above. Cover the whole with a layer of earth. When a sufficient quantity of refuse is again collected, place it on top of the heap and cover with a layer of lime, and lastly of earth, until the heap is 3 to 4 feet high. The heap should be kept moist, and for this purpose all refuse water from the house, slops, &c., should be added. The heap may be conveniently watered by making a hole in the interior and pouring the liquid in. The final covering with earth has the object of absorbing any ammonia which is evolved in the process of fermentation and by the action of the lime.

When the heap has been prepared it must be left to itself to ferment for a greater or less time. Probably a few months will be sufficient, unless very refractory substances, such as bone, &c., are present. In a few months' time it should be well forked over and another layer of lime and finally of earth should be added. In the course of another month or two it should be ready for use, and will provide at a very slight cost an excellent manure rich in humus, and will have utilised for the purpose a great amount of refuse material which would otherwise have been lost or burnt.

When refuse material is burnt, the ashes, though still possessing manurial value on account of the lime, potash, and phosphates they contain, are of incomparably less value than the original substances out of which they are derived, owing to the absence of humus material and of nitrogen, which have been lost in the process of burning.

Instead of a heap, the compost may be conveniently prepared in a pit. In either case the bottom should be cemented, or so drained that the liquid escaping from the mass can be collected and returned to the compost.

It will be found advantageous to prepare a second heap while the first one is ripening and being used. It will also be found that if it is desired to use more concentrated fertilisers, such as superphosphate, potash, and ammonium salts, these can be mixed with advantage with the compost manure before it is applied to the land. Used in this way they will be in less danger of leaching away, and will be of greater benefit than if applied directly to the land.

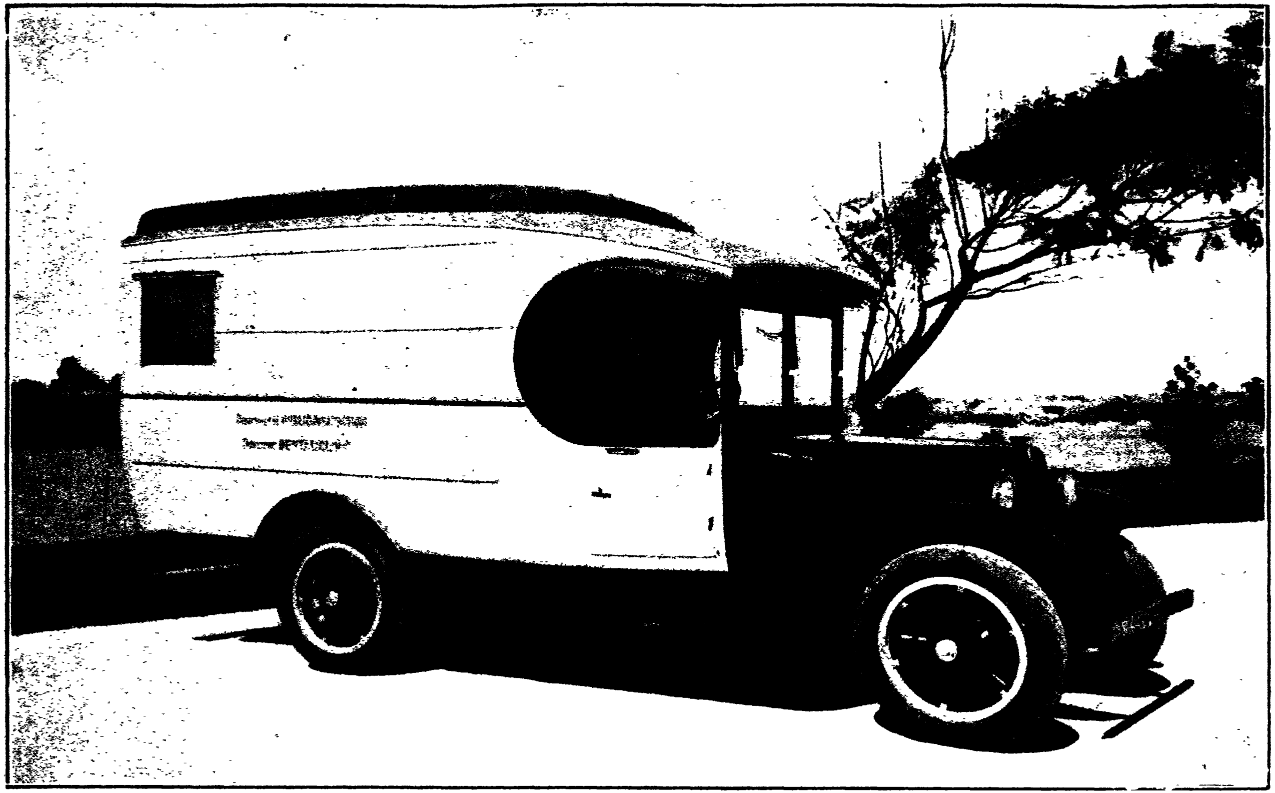
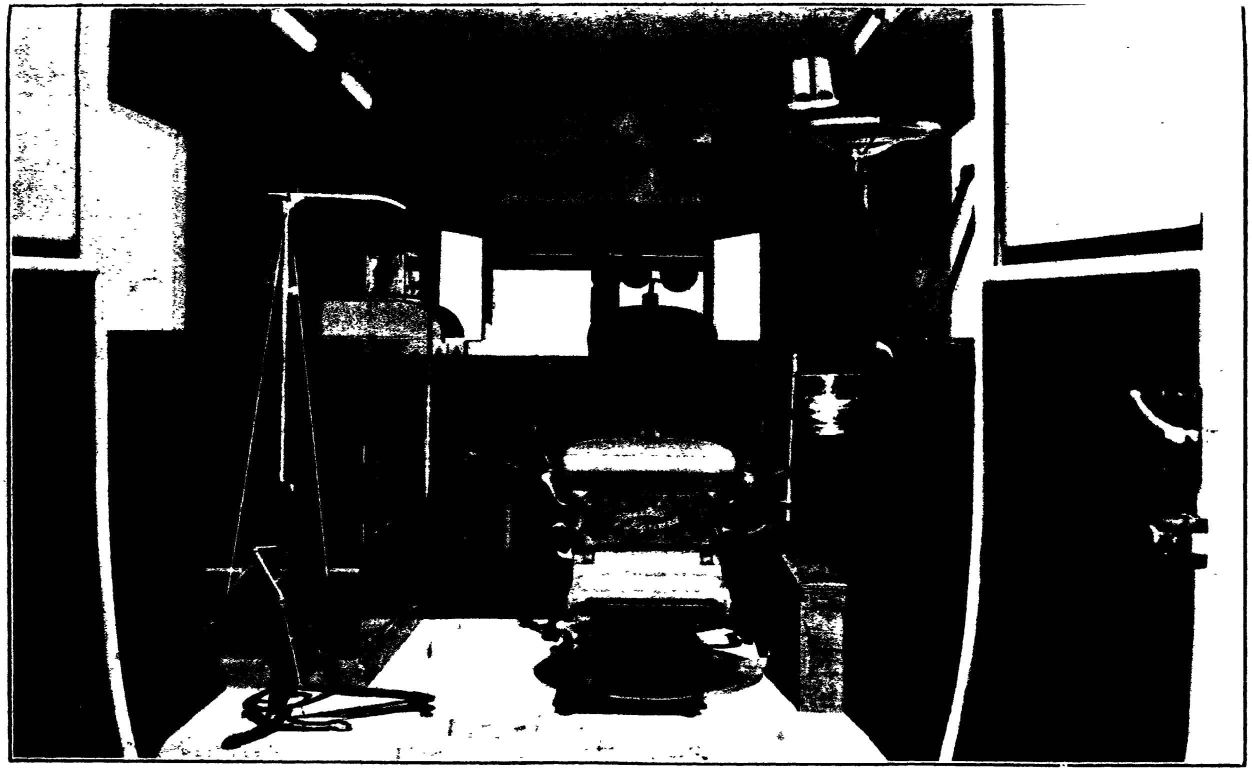


Photo.: Dept. of Public Instruction.]

PLATE 191.—A TRAVELLING DENTAL CLINIC IN QUEENSLAND.

The School Dental Service provided by the Department of Public Instruction is of inestimable value, particularly in the country districts. It is ever striving for the better control of dental disease with prevention as the ultimate goal.



Pho'o.: Dept. of Public Instruction.]

PLATE .192—INTERIOR OF A TRAVELLING DENTAL CLINIC.

In a survey conducted by the Chief Dental Inspector of Schools last year a very great reduction in dental troubles among Queensland school children was recorded, and the number of scholars under conservative dental care had increased by 125 per cent. These results may be credited almost entirely to the corrective operative measures carried out by the Dental Service.

MARKET GARDENING.

(Continued from Previous Issues.)

CAPSICUM OR PEPPERS.

The capsicum or cayenne pepper requires a light, rich soil and warm situation. Sown in the early spring, the young plants, when large enough, may be transplanted out in rows 3 ft. apart, with a distance of 2 ft. between the plants in the rows. This plant is of easy cultivation and is in considerable demand for pickle and pepper manufacturing.

The larger varieties are milder than those of the smaller kinds. Those recommended are—Long Red; Bird's Eye (for pickling); Large Red (culinary); Dwarf Early Red.

CARROTS.

The best crops of carrots are grown on land heavily manured for the preceding crop. Deep cultivation is essential. If manuring should be necessary, well-decomposed stable manure may be used, but must be thoroughly incorporated with the soil, and a fine tilth obtained before sowing the seed.

Insufficient depth of cultivation has a tendency to produce forked roots. In shallow soils seed of the short varieties, such as Nantes and Guerande will give the best results.

The seed should be sown thinly, in drills, and care be taken to get the hoe at work as soon as the seed appears. When large enough they should be thinned out from 4 to 6 in. apart, according to size of variety.

The best varieties of long carrots are James's Intermediate and St. Valery, and for cattle-feed the white and yellow Belgian varieties.

Carrots are fit for use in about four months.

CELERY.

This crop requires a deep rich soil and a moist situation if possible.

Sow thinly in a good sheltered seed-bed during early autumn. When the plants are 3 or 4 in. high transplant into deeply trenched and well-manured soil.

Celery is generally grown in trenches, although it may be grown in the open ground. This latter plan has the advantage of saving considerable labour, and the plants have a greater depth of soil than if planted in deep trenches, where, in most instances, they would only have the subsoil to subsist on.

During the growing period the plants must be kept free from weeds, and when large enough, may be gradually earthed up, care being taken in the final earthing that the soil does not fall into the heart of the plant.

Varieties recommended—White Plume, Golden Self Blanching, Giant Pascal.

CHOKOS.

Where a sufficient amount of moisture is available chokos form an acceptable change in vegetable diet. Of climbing habit and easy of cultivation, they adapt themselves to most soils, but best results are obtained from those containing plenty of vegetable matter.

They are propagated from the fruit, which, if planted in the spring, produces a profusion of vines, and a large crop of this useful vegetable for autumn and winter.

CUCUMBERS.

Suited for rich sandy soils; and if the natural soil does not answer this description it is worth while bringing it up to the required standard in order to ensure success. Seed may be sown in early spring in shallow drills or in hills, with a distance of 4 to 5 ft. between the rows. The soil must be kept loose and free from weeds by frequent hoeings, and applications of liquid manure or abundant watering will be necessary during dry weather in order to procure long crisp fruit. Mulch well.

The variety recommended for market sale is Imperial White Spine, and for pickling Early Green Cluster.

SHALLOTS AND GARLIC.

The preparation of the soil is similar to that for the onion. The cloves should be placed in shallow drills spaced 6 in. apart, care being taken not to cover them too deeply. As they grow they should not be earthed up; on the contrary, when approaching maturity the soil may be lightly drawn away from them with a hoe. This exposes the bulb and facilities ripening. Shallots are used for culinary and salad purposes, their flavour being milder than that of garlic or onions. They may be planted in early spring or autumn.

GINGER.

Is suited only to warm situations, and is easily grown in any light loam rich in vegetable matter, and possessing good natural drainage.

Cultivation is similar to that necessary for potatoes, the only difference being that prior to planting the land is ridged with a drill plough, the ridges being 3 ft. apart, the rhizomes planted during September in the ridges 12 in. apart and about 3 in. under the surface.

The crop matures in about ten months, and should be harvested after the tops have died off.

In lifting, care should be taken not to injure the hands or rhizomes.

The preparation of these for market is the placing of them in boiling water for about five minutes and then drying in the sun.

HERBS.

These are worthy of more attention than is usually given to them, owing to the increased demand which at present exists.

Formerly the Australian market was supplied by European countries, large importations of dried herbs being made from England and France.

Herbgrowers in the Cleveland district are waking up to the fact that a profitable industry is at their doors, and this has resulted already in larger areas being put under marjoram and sage, for which local buyers have in many instances entered into contracts to purchase twelve months ahead.

Any soil of a loamy character and containing plenty of humus is suitable for the growth of herbs, but cultivation must be attended to and all forms of weed-growths kept down. Sage, thyme, and marjoram are usually propagated from cuttings or division of the roots, but they may also be raised from seed sown in early spring. Two or three cuttings may be obtained in a year, the crop being cut when coming into flower, a sharp sickle being used, and the plants cut close to the ground.

After cutting, they should be allowed to wilt in the sun, and then thoroughly dried under cover, to retain as much colour as possible.

KOHL-RABI.

Kohl-rabi, or turnip-rooted cabbage, is, as its name denotes, an intermediate between the cabbage and turnip combining the flavour of both. The edible portion consists of a turnip-shaped bulb, which is in reality a swelling of the main stem. For table, this should be used when quite small, as it is then tender and delicate, but if allowed to reach maturity it becomes tough and stringy. The purple variety is the best for table use; whilst for cattle-feeding the green variety is most suitable. This plant is remarkable for its immunity from insect attack and power to resist frost and fungoid diseases. It will stand transplanting better than any other root crop, thus rendering it valuable for filling up blanks.

The sowing and subsequent cultivation is similar to that for swedes.

LEEKS

Leeks appreciate a deep, friable, and rich soil. Sow in spring and early summer, and when the thickness of a goose-quill transplant into shallow trenches, spacing the plants 6 in. apart and nipping back the tops in the process of transplanting. Treat as you would celery, gradually drawing the soil up the stem as the plant grows, thus blanching them. Keep well watered during the dry months; liquid manure can be applied with advantage.

The seed may be sown in the autumn, and varieties recommended are—London Flag, The Lyon.

LETTUCE.

This useful salad plant may be had all the year round by frequent sowings and plantings.

A warm dry situation should be chosen for the winter crop, and one that is shaded and moist for summer sowings.

The soil should be loose and rich, for lettuces are only crisp when rapidly grown.

Summer sowings must be made where the plants are to stand, as they cannot be transplanted during the dry, hot weather with any degress of success.

Varieties recommended are—Neapolitan; Hanson; Iceberg; May King.

MUSTARD AND CRESS.

With a climate in which salads and green foods are necessary, these useful salading plants are usually conspicuous by their absence. The seed may be sown thickly in broad rows and cut when about 2 in. high. Cress being a slower grower than mustard, if intended to be used with it, should be sown a week earlier. For succession sow every ten days.

ONIONS.

The onion requires a deep, loamy soil, and one which lends itself to deep cultivation.

The character of the soil determines the depth of ploughing, which cannot be too deep, provided the subsoil is not brought to the surface.

Frequent cross-cultivation and harrowings are essential to reduce the soil to a fine tilth and destroy any weed-growth which might otherwise put in its appearance during the process of cultivation.

The soil having had a thorough course of preparation should be rolled for the reception of the seed, which is sown in shallow drills spaced 12 to 15 in. apart.

For large areas, sowing the seed by a special onion-drill is recommended. Several inexpensive makes are advertised by various implement makers.

From its first appearance above the soil the crop must be kept absolutely clean of all weeds and foreign growth if success is to be attained.

Where blanks are present, transplanting may be carried out, but care must be taken that the plants are not put in deeply, as this is conducive to thickness in the stem, with attendant poor keeping qualities.

On reaching maturity bending the stems over is of great assistance in ripening; when the tops are thus withered, the bulbs should be lifted; and where a considerable quantity of bulbs has to be dealt with, hand and horse-drawn implements are available at a moderate cost, considerably reducing what otherwise is a somewhat tedious operation.

The bulbs should be left in windows until dry, when they can be carted and stored in racks—not too deeply—in a well-aired shed; care being taken that they are not bruised in the operation. It is advisable to turn them from time to time and remove all damaged or decayed bulbs.

The seed for the main crop should be sown in the autumn. The varieties recommended are:—Hunter River Brown Spanish and Australian-grown Brown Spanish, for keeping; Silverskin or Queen, for pickling; White Lisbon, for pulling green for salads; White Italian Tripoli, for early cropping.

NOTE.—For pickling and salad purposes the seed requires to be sown thicker.

(To be continued.)

DRACAENAS.

Dracænas are hardy plants with very richly coloured and variegated foliage. They are closely allied to the genus cordyline, with which they are often confused. The difference between the two is chiefly in the character of the fruits, there being generally one ovule in the dracæna and many ovules in the cordylines. Dracænas are among our most beautiful foliage plants. Propagation is generally by cuttings, which root readily at any time of the year. The old stem of the plant, cut into short lengths and planted in a compost, invariably roots, and throws up shoots which may be potted up. The root suckers which are often found upon old plants are also useful for increasing stock. All that is necessary is to cut them off and pot them.

The best soil for potting the young stock is made of equal parts of loam and leaf mould, with sufficient sand to keep the soil porous. Dracænas do not require large pots, but they must be firmly potted and given plenty of water.

Mealy bugs and thrips are the chief enemies. The large leaves permit of the free use of the sponge. Dracænas are fine indoor plants, but they must not be kept inside for more than a week or so at a time, and they must be kept out of draughts.

Farm Notes for December.

Although November is regarded generally as the best period for planting the main maize crop, on account of the tasseling period harmonising later on with the summer rains, December planting may be carried out in districts where early frosts are not prevalent, provided a known quick maturing variety of maize is sown.

To ensure a supply of late autumn and winter feed, dairymen are advised to make successive sowings of maize and sorghums, to be ultimately used either as green feed or in the form of silage. The necessity for such provision cannot be too strongly urged. Farmers who have not had any experience in building an ensilage stack can rest assured that, if they produce a crop for this purpose, information and instruction on the matter will be given on application to the Under Secretary for Agriculture and Stock; also that, whenever possible, the services of an instructor will be made available for carrying out a demonstration in ensilage-making for the benefit of the farmer concerned and his immediate neighbours.

In districts and localities where supplies of lucerne are not available, sowings of cowpeas should be made, particularly by dairymen, as the lack of protein-yielding foods for milch cows is a common cause of diminished milk supplies and of unthriftiness of animals in dairy herds. Cowpeas and lucerne can be depended upon to supply the deficiency. The former crop is hardy and drought-resisting. When plants are to be used as fodder, it is customary to commence to feed them to stock when the pods have formed. Animals are not fond of cowpeas in a fresh, green state, consequently the plants should be cut a day or two before use. Economy is effected by chaffing beforehand, but the plants can also be fed whole. Chaffed in the manner indicated, and fed in conjunction with green maize, or sorghum, when in head, in the proportion of one-third of the former to two-thirds of the latter, a well-balanced ration is obtainable. Animals with access to grass land will consume from 40 to 50 lb. per head per day; a good increase in the milk flow is promoted by this succulent diet. The plant has other excellent attributes as a soil renovator. Pig-raisers will find it invaluable also.

A great variety of quick-growing catch crops, suitable for green fodder and ensilage purposes, may also be sown this month, notably Sudan grass, white panicum, giant panicum (liberty millet), Japanese millet, red and white French millet. Well prepared land, however, is required for crops of this description, which make their growth within a very limited period of time. French millet is particularly valuable as a birdseed crop, the white variety being more in favour for this purpose.

Successive sowings may be made of pumpkins, melons, and plants of this description.

In districts where onions are grown, these will now be ready for harvesting. If attention is given, in the case of garden plots, to bending over the tops of the onions, maturity of the crop is hastened. Evidence will be shown of the natural ripening-off process, and steps should be taken to lift the bulbs and to place them in windrows until the tops are dry enough to twist off. If a ready market is not available, and it is decided to hold over the onions for a time, special care should be taken in handling. Storage in racks in a cool barn is necessary; otherwise considerable deterioration is to be expected. Improved prices are to be looked for in marketing by grading and classifying produce of this description.

Cotton areas which were subjected to a thorough initial preparation, thereby conserving a sufficiency of moisture for the young plants, should now be making good headway and sending their taproots well down. Keep down all weed growth by scarifying as long as the growth will admit of horse work.

Orchard Notes for December.

THE COASTAL DISTRICTS.

The planting of pineapples and bananas may be continued, taking care that the ground is properly prepared and suckers carefully selected, as advised previously in these Notes. Keep the plantations well worked and free from weeds of all kinds, especially if the season is dry. New plantations require constant attention, in order to give young plants every chance to get a good start; if checked when young they take a long time to pull up and the fruiting period is considerably retarded. Small areas well worked are more profitable than large areas indifferently looked after, as the fruit they produce is of very much better quality. This is a very important matter in the case of both of these fruits, as with the great increase in the area under crop there is not likely to be a profitable market for inferior fruit. Canners only want first-class pines of a size that will fill a can, and cannot utilise small or inferior fruit, except in very limited quantities, and even then at a very low price. Small, badly filled bananas are always hard to quit, and with a well-supplied market they become unsaleable. Pineapple growers, especially those who have a quantity of the Ripley Queen variety, are warned that the sending of very immature fruit to the Southern markets is most unwise, as there is no surer way of spoiling the market for the main crop. Immature pineapples are not fit for human consumption, and should be condemned by the health authorities of the States to which they are sent.

Citrus orchards require constant attention; the land must be kept well worked and all weed growth destroyed. Spraying or cyaniding for scale insects should be carried out where necessary. Spraying with fungicides should be done where the trees show the need of it. A close lookout must be kept for the first indications of "maori," and as soon as it is discovered the trees should either be dusted with dry sulphur or sprayed with the lime-sulphur, potassium, or sodium sulphide washes. Borer should be looked for and destroyed whenever seen.

Early grapes will be ready for cutting. Handle carefully, and get them on to the market in the best possible condition. A bunch with the bloom on and every berry perfect will always look and sell well, even on a full market, when crushed and ill-packed lines are hard to quit.

Peaches, plums, papaws, and melons will be in season during the month. See that they are properly handled. Look our for fruit fly in all early ripening stone fruit, and see that none is left to lie under the trees to rot and thus breed a big crop of flies to destroy the mango crop when it ripens.

Keep leaf-eating insects of all kinds in check by spraying the plants on which they feed with arsenate of lead.

Look out for Irish blight in potatoes and tomatoes, and mildew on melons and kindred plants. Use Bordeaux or Burgundy mixture for the former, and finely ground sulphur or a sulphide spray for the latter.

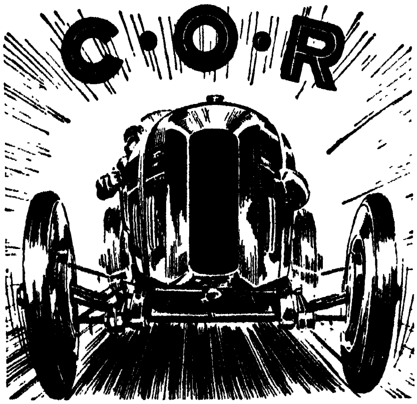
THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Early ripening apples, plums, apricots, peaches, and nectarines will be ready for marketing during the month. They are unsatisfactory lines to handle, as the old saw, "Early ripe, early rotten," applies to all of them; in fact, the season of any particular variety is so short that it must be marketed and consumed as quickly as possible. All early ripening deciduous fruits are poor carriers and bad keepers, as their flesh is soft and watery, deficient in firmness and sugar, and cannot, therefore, be sent to any distant market. The available markets are quickly over-supplied with this class of fruit, and a glut takes place in consequence. Merchants frequently make the serious mistake of trying to hold such fruits, in the hope of the market improving, with the result that, instead of improving, the market frequently becomes more and more congested, and held-over lines have to be sent to the tip. There is only one way to deal with this class of fruit, and that is to clear the markets daily, no matter what the price, and get it distributed and into consumption as rapidly as possible by means of barrowmen and hawkers. Most early ripening fruits are useless for preserving in any way, their only value being what they will bring for consumption whilst fresh. This being so, it is only a waste of time and money to forward immature, undersized, and inferior fruit to market, as it is not wanted, and there is no sale for it. It should never have been grown, as it is frequently only an expense to the producer, besides which, unless the fallen or over-ripe fruit is regularly and systematically gathered and destroyed in the orchard, it becomes a breeding ground for fruit fly and codlin moth, as well as of fungi, such as those producing the brown and ripe rots. Early ripening fruits should, therefore, be carefully graded for size and quality, handled, and packed with great care, and nothing but choice fruit sent to market. If this is done, a good price will be secured, but if the whole crop—good, bad, and indifferent—is rushed on to the local markets, a serious congestion is bound to take place and large quantities will go to waste.

Orchards and vineyards must be kept in a state of perfect tilth, especially if the weather is dry, so as to retain the moisture necessary for the development of the later ripening fruits. Where citrus fruits are grown, an irrigation should be given during the month if water is available for this purpose, excepting, of course, there is a good fall of rain sufficient to provide an ample supply of moisture.

Codlin moth and fruit fly must receive constant attention and be kept under control, otherwise the later-ripening fruits are likely to suffer severely from the depredations of these serious pests.

Grape vines must be carefully attended to and sprayed where necessary for black spot or downy mildew, or sulphured for oidium. Where brown rot makes its appearance, spraying with the potassium or sodium sulphide washes should be carried out. Leaf-eating insects of all kinds can be kept in check by spraying with arsenate of lead.



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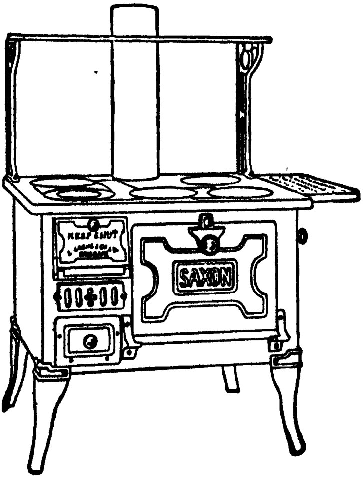

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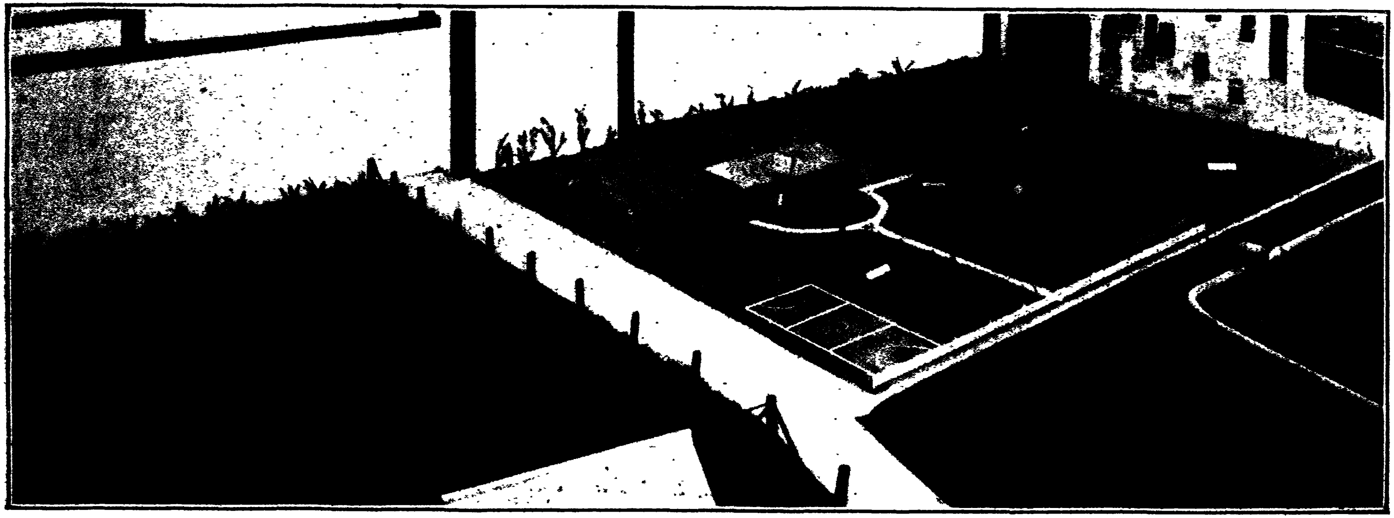

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J. F. F. REID,
Editor of Publications, Department of Agriculture and Stock.

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ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

	November, 1929.		December, 1929.		MOONRISE Nov., 1929.	MOONRISE Dec., 1929.
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
1	5.4	6.8	4.50	6.32	a.m. 4 42	a.m. 4.24
2	5.3	6.9	4.50	6 32	5 6	5.9
3	5 3	6 9	4.50	6.33	5. 50	5.57
4	5.2	6 10	4.50	6.34	6 30	6 48
5	5 1	6.11	4.50	6.35	7.15	7.42
6	5.0	6 12	4.50	6.35	8.4	8.37
7	5.0	6.12	4.50	6.36	8.57	9.31
8	4.59	6.13	4.51	6 37	9.49	10.26
9	4.58	6.14	4.51	6.37	10.38	11.20
10	4.58	6.15	4.52	6.38	11.40	p.m. 12.16
11	4 57	6.16	4.52	6.38	p.m. 12.36	1.11
12	4.57	6.16	4.53	6.39	1.33	2.9
13	4.56	6.17	4.53	6.39	2.29	3.10
14	4.55	6.18	4.54	6.40	3 28	4 17
15	4 55	6.19	4.54	6.40	4 30	5.27
16	4.54	6.20	4.55	6.41	5.33	6.36
17	4 54	6 21	4.55	6.41	6.13	7.46
18	4 54	6 22	4.55	6.42	7.52	8.50
19	4 53	6.23	4.56	6.43	9.0	9.47
20	4.53	6.23	4.56	6.44	10.4	10.30
21	4.53	6.24	4.56	6.44	11.3	11.9
22	4 53	6.24	4.57	6.45	11.53	11.43
23	4.52	6.25	4.57	6.45	...	...
24	4.52	6.26	4.58	6.46	a.m. 12.46	a.m. 12.16
25	4.52	6.27	4.58	6.46	1.15	12.46
26	4.51	6.27	4.59	6.46	1.42	1.18
27	4.51	6.28	4.59	6.47	2.13	1.51
28	4.51	6.29	5·0	6·47	2.44	2.27
29	4.51	6.30	5.0	6.47	3.14	3.6
30	4.51	6.31	5.1	6.48	3.39	3.52
31			5.2	6.48		4.48

Phases of the Moon, Occultations, &c.

1 Nov.	● New Moon	12	1 p.m.
10 ,,	☾ First Quarter	12	10 a.m.
17 ,,	○ Full Moon	10	14 p.m.
24 ,,	☽ Last Quarter	2	4 a.m.

Apogee, 7th November, at 9·0 p.m.

Perigee, 19th November, at 3.48 p.m.

If it were not for their apparent nearness to the Sun, the remarkable proximity of Mercury and Mars to one another on the 30th would form an interesting spectacle. They will rise practically with the Sun, but, of course, will be entirely lost in its effulgence. Venus and the Moon will be looking on from the near neighbourhood, but it will be a day later before the Moon joins the brilliant gathering by drawing, apparently, much nearer to the Sun.

By the time the Sun sets on the 1st November the Southern Cross reaches a position so low down in the south-west that it may be said to be lost to the evening sky for the next four months, as far as Queensland is concerned.

1 Dec.	● New Moon	2	48 p.m.
9 ,,	☾ First Quarter	7	42 p.m.
16 ,,	○ Full Moon	9	38 p.m.
23 ,,	☽ Last Quarter	12	27 p.m.
31 ,,	● New Moon	9	42 a.m.

Apogee, 5th December, at 3.24 p.m.

Perigee, 17th December, at 10.6 p.m.

Conjunctions of the Moon with Mercury and Mars will occur on the 1st, when all are below the horizon in Queensland.

Mars, which was disappearing from the evening sky soon after sunset in October, will be passing from the east to the west side of the Sun on 3rd December. It will then be on the far side of its orbit and about 140 million miles beyond the Sun. Mars will be rising and setting so nearly at the same time as the Sun that it will be practically invisible this month, but the much larger planet Jupiter, being on the opposite side of the sky, will rise on the 3rd as the Sun sets. Venus will be noticeable only in the early morning a little before sunrise, and will be loosing her brilliance as the month advances.

Mercury, apparently amongst the stars of Orphineus, and higher up Saturn, apparently in Sagittarius, will be noticeable near the western horizon as the twilight decreases on the 15th.

Mercury and Mars, which appeared to be in nearly the same place in the sky on 30th November, will set only about a quarter of an hour after the Sun on 1st December, but the rapid motion of Mercury will carry it eastward so quickly that it will not set until an hour and three quarters after the Sun on the 15th, while Mars will set a quarter of an hour before the Sun. Jupiter will rise at 6.41 p.m. on 1st December, and at 5.86 p.m. on the 15th; Saturn will set at 8.6 p.m. on the 1st, and at 7.17 p.m. on the 15th.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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VOL. XXXII. 1 DECEMBER, 1929. PART 6.

Event and Comment.

The Year in Agriculture.

A GENERAL survey of the agricultural position in Queensland is made by the Under Secretary for Agriculture and Stock, Mr. E. Graham, in his annual report which was recently presented to Parliament. In it he states that the general average yield of wheat crops was not as heavy as in the previous year, which was remarkable for an extraordinarily good season; but, on the whole, for the period under review the returns were satisfactory. A steady improvement in methods of cultivation was noticeable, especially on the Downs, where the practice of summer fallowing is becoming more general. Wheat-growing is now allied to dairying and sheep-raising to a much larger extent than formerly, and the value of this economic combination is becoming evident to many more farmers in the districts where the conditions are suitable for all three branches of husbandry. The wheat-breeding and extension work of the Department is proceeding satisfactorily. Experimental and general observation plots have been established in different districts. The systematic breeding and selection of wheats adaptable to our conditions of summer rainfall, which are carried on at the Roma State Farm and have continued over a long period, have been of material benefit to the grain-grower. About a hundred new Roma crossbred wheats are tested each season, and in these field trials the Department has had the co-operation of the farmers and also of the Wheat Board. As a stimulus to the application of scientific principles to primary production, the usual annual wheat crop competitions were held in the course of the year in the Warwick and Toowoomba districts. That the educational value of these competitions is widely recognised is evident by the keen interest taken in them by grain-growers.

Maize-growers are feeling the effects of a lessening demand, due to the ever-increasing use of motors on the road and tractors in the field. A depression in the industry was relieved to some extent by the necesity of hand-feeding sheep, for which maize is being more extensively used as a supplementary stock food in districts affected by prolonged dry spells.

Northern growers are handicapped by their geographical position, which involves heavy charges in the transport of grain to available markets. Farmers there are, however, appreciating the economy of retaining, when practicable, their grain on the farm for feeding and fattening stock.

In the seed maize improvement work satisfactory progress is being made, and the demand for seed of improved varieties selected by the Department is constant.

The maize exhibits at the Royal National and at many country shows, in the course of the year, illustrated the marked improvement in the types and quality of Queensland-grown grain, and it is satisfactory to observe that in the more important maize-growing districts the principal varieties are of departmental origin. The educational scheme initiated and carried on by the Department, and which covers the systematic breeding and regular distribution of pure seed, is the main contributing factor in bringing about this result. Three-fourths of the maize production of the State is raised in the Southern Division, which had the benefit of a fairly good season, and the Queensland yield for the year is estimated to exceed 4,000,000 bushels. Of other field crops a similar story of steady progress and satisfatory yield is related.

Improvement of paspalum and other pastures engaged the attention of the field staff in the course of the year. Results so far show that ploughing is the most effective means of resuscitating paspalum grass-lands. Top-dressing of pastures is a subject of continuous research, but from an analytical standpoint results so far have been largely negative. As a counter to the effect of these findings and as a measure of economy, the more extensive use of suitable stock licks is generally advocated.

Grass experiment plots have been established in suitable localities, and in these a number of imported grasses are being tested with varying results.

The Sugar Industry.

THE sugar industry of Queensland established fresh records during the 1928 season, when 520,620 tons of raw sugar were produced. Conditions favourable for cane growth were general throughout the growing season. The autumn and winter were unusually dry, however, and portions of the crop were affected adversely before the close of the crushing season. This caused a reduction in the early cane estimate, but probably favoured the sweetening of the crop, for it required only 7¼ tons of cane to produce 1 ton of sugar—the lowest ratio yet recorded in Queensland. The heavy production resulted in a very considerable surplus over and above Australian requirements. The question of curtailment of plantings has been an important one during the past year, and it is expected that definite steps will be taken in the near future to restrict the area devoted to cane and hence reduce the surplus.

The exploitation of by-products of the industry continues to receive attention, and alcohol produced by the Sarina Distillery from molasses has been made available this year as a motor fuel. Mixed with petrol in suitable proportion, it is now marketed in Queensland under the name of ''Shellkol.''

With continued low export values, the Bureau of Sugar Experiment Stations finds growers taking a keener interest in its activities. Advice on the use of correct fertilisers to bring about a more intensive system of cultivation and the consequent reduction in production costs is widely sought. A more active programme of co-operative experimental work has been planned. A system of farm fertility trials has been initiated, and growers are showing a great interest in the project. By this method of field trial work much valuable information should be gained, which will assist the farmers directly concerned and also allow recommendations to be made with a greater degree of confidence. The plan will be extended to varietal trials and cultural experiments. The raising of seedling canes at South Johnstone has been continued, and all these and similar activities in the scientific field give emphasis to the high standards that have been established in the industry, and these would have been, of course, very difficult of attainment without the intelligent co-operation of the growers.

Cotton.

IT was possible this season to dispose of the lower grades of cotton in Australia at prospective satisfactory prices. This advantage, together with the arrangement of the Cotton Board for higher first advance on seed cotton at the ginnery, helped the industry very materially. Interest in cotton-growing had definitely increased in the Southern areas prior to the time of planting, but absence of spring rains diverted attention to the necessity of concentrating on the production of fodder crops; and as a result cotton acreages were limited. Good returns have, however, revived interest in cotton-growing, and its extension in the coming year is a reasonable anticipation.

In the South Burnett interest in cotton has been stimulated by the good crops picked on departmental experiment plots in the district, several yielding around 1,500 lb. an acre of high-quality fibre.

Only moderate returns have been obtained in the Central Burnett, where, however, yields up to 1,500 lb. an acre on experimental plots are influencing a substantial extension of cotton cultivation. The experience of the year is on the side of early planting, and this has impressed growers with the necessity of early and thorough preparation of the seed-bed, a practice ensuring a successful strike after the first planting rains. The year's results have, however, not disheartened growers, and an increased planting is planned for 1930.

There was a decline in the standard of cultivation, but this may be ascribed to the various factors, weather included, that affected the year's operations. Notwithstanding seasonal variability, however, the value of timely and systematic cultivation was demonstrated clearly by those growers who realise that it pays to grow cotton in accordance with the principles and practice advocated by the officers of the Cotton Branch.

There was a substantial reduction in the aggregate yield of cotton on last year's returns, and this was due to lower production in the Dawson Valley and smaller acreages in the Upper Burnett. There was, however, a considerable improvement in the general quality of the crop as compared with that of last year. The work of the research station was continued, and results clearly demonstrated the value of early planting.

Seasonal vagaries were against the securing of the best results from our pure seed development work, though considerable success attended seed acclimatisation efforts. The work of developing acclimatised strains of introduced varieties also proceeded satisfactorily, although no remarkable results were obtained.

Varietal tests, fertiliser trials, and cultural methods are receiving the close attention of the Department, to the general advantage of the industry.

Adding to the Attractions of Country Life.

CONCLUDING his comprehensive review of the year's activities of the Department, which is ever widening its range and extending its influence, Mr. Graham added that, though temporary checks were experienced in some directions, there are good grounds for satisfaction with the progress made. We have to remember that agriculture is not the only industry passing through the stress and strain of a transitional period; it is not the only industry that has had to adapt its methods to modern ideas, modern market requirements, and, in the disposal of some commodities at least, keener competition. The economic side of the business is being tackled resolutely in this State. Through our system of organised marketing of commodity by commodity we are moving gradually, but surely, to the position when we can offer the consumer a better and standardised article more regularly under proper control, and thus earn for the producer a larger proportion of what the consumer has to pay. It will take time, of course, to perfect such a system, but its complete success would mean a more attractive country life, a bigger rural population, decentralisation of economic and commercial interests, and a more rational national development.

Bureau of Sugar Experiment Stations.

CANE PEST COMBAT AND CONTROL.

The Entomologist at Meringa, near Cairns, Mr. Edmund Jarvis, has submitted to the Director of the Bureau of Sugar Experiment Station, Mr. H. T. Easterby, the following report, embracing the period of October to November, 1929:—

ASSOCIATION BETWEEN THE ENTOMOLOGIST AND CANEGROWER.

In the present report I have attempted to define the true meaning of the term "Economic Entomologist," and to outline the nature of certain activities which should tend to promote the establishment of cordial relationship between the scientist and cane farmer.

The importance of this close association between entomology and agriculture in Queensland was first recognised as early as the year 1886, which was about the time when Mr. Henry Tryon published his valuable report on the insects and fungus pests of the Toowoomba district; while more than forty years have passed since the Victorian Department of Agriculture began to realise the advisability of appointing a Government Entomologist to fight such destructive insects as the codlin moth, woolly aphis, and apple-root borer, which had then gained a footing in several orchards around Melbourne.

In the year 1889, when the present writer first arrived in Australia, the study of control methods against leaf-eating beetles, caterpillars, and other mandibulate or chewing insects was chiefly confined to various kinds of arsenical sprays; the sap-sucking insects, like aphides, scale insects, plant bugs, &c., being combated in those early days by the use of such well-known contact solutions as resin compound, kerosene emulsion, &c.

At the present time, however, our knowledge of economic entomology has naturally increased, so that, although still continuing to devise more deadly and cheaper poison-baits and sprays, we have now pressed into the warfare numerous species of the parasitic and predaceous enemies of many different insect pests of primary economic consequence; with the result that some of these are now being held in control biologically.

In North Queensland, for instance, the much dreaded "weevil borer" (*Rhabdocnemis obscurus* Boisd.) is at present being kept well in check by a small Tachinid fly-parasite, hundreds of which are regularly propagated at Meringa Experiment Station for free distribution in any canefield chancing to be invaded by the beetle-borer.

It is gratifying to note that this phase of activity—which calls for concerted action on the part of both grower and entomologist—has been instrumental, in our own case, in establishing those harmonious relations which are so necessary to the welfare of all parties concerned.

In this connection it should be mentioned that apart from biological control work, several additional fields of entomological research have been opened up of late years; the most fascinating of these being, perhaps, that dealing with the study of so-called tropic reactions, of a positive or negative kind, which are believed to be manifested by insects in response to influences exerted by various stimuli, affecting the olfactory, auditory, or other complex sense organs.

As already pointed out by the present writer (Proc. Pan. Pac Sc. Congress, vol. 1, pp. 367-68, 1923), we have good reason for assuming that the movements of our principal cane beetle (*Lepidoderma albohirtum* Waterh.) are sensibly influenced by forces of a chemotropic nature; which probably determine to some extent the direction of flight of the female cockchafer during the fortnight preceding egg laying.

It is pleasing to note that the help afforded by this Sugar Experiment Station, to farmers of the Cairns district, appears to have won recognition, and during recent years there have been many applications for assistance in fighting "army worms" and other caterpillars which sometimes strip the leaves of cane plants. Our mode of procedure in such cases is not merely to give advice by letter, but to go into the affected field when possible, taking the necessary spraying apparatus, and to show the grower how to prepare and apply the remedy.

ENTOMOLOGICAL HINTS TO CANEGROWERS.

By EDMUND JARVIS.

When to Expect Appearance of "Greyback" Beetles.

Cane beetles are likely to emerge from the ground about the middle of this month (November). Owing to the prolonged spell of dry weather experienced in many cane districts, transformation from the pupa or chrysalis condition to the adult winged form of this insect occurred in most places early in October. Should a few inches of rain, however, chance to fall during the second or third week in November, such downpour would be followed at once by an emergence of these cockchafer beetles. On the other hand, a continuance of drought conditions throughout November and half way through December should operate as a decided check to the increase of our notorious cane pest.

Arrange about Collecting Cockchafers.

On cane areas known to be subject to grub attack it is advisable to start collecting the beetles from the foliage of their feeding-trees as soon as they are noticed on the wing.

Now is the time to locate the position of favourite food-plants such as Weeping Figs, "Moreton Bay Ash" trees, &c., chancing to grow close to headlands of your canefield.

To facilitate the work of collecting, the surface of the ground under these trees should be cleared of vegetation, in order that all beetles falling upon it may be easily seen and picked up. Such collecting should be carried on throughout a period of about three weeks, dating from the day on which "greybacks" emerge from the ground. A careful note should be made of this date of commencement of the flighting season, as in the event of any farmer wishing later on to fumigate his soil for cane grubs, such information would enable him to determine the age of the grubs present together with the correct time for starting control measures.

Keep the Ground Moving during the Flighting Season.

Common-sense control methods of keeping the soil moving between cane rows as much as possible during those periods occupied by the egg and early larval conditions of our "greyback" cockchafer are within reach of all growers, and have already been advocated as being advantageous (Bull. No. 19, pp. 59, 60). A dense growth of weeds between cane rows attracts egg-laden females of both *albohirtum* and *frenchi* ("greyback," and "frenchi beetle"), the latter cockchafer being very prone to oviposit in such places.

Do not allow the surface to remain caked after heavy rain longer than can be helped. Every time the ground is stirred to a depth of about 3 inches soil-moisture is conserved, and a certain percentage of unhatched beetle eggs or small grubs of the first-stage of growth is destroyed, together with germinating seeds and tiny plants of different weeds.

How to Store Insecticides and Spraying Apparatus.

Carbon bisulphide.—Drums containing this fumigant should be locked up in some cool, dry shed. Before storing same, examine each drum for possible leakage. When a drum is opened do not bring a light of any kind near it or even a lighted pipe or cigarette.

Paradichlorobenzene.—Keep receptacles containing this chemical, such as barrels or tin canisters, as airtight as possible to prevent needless evaporation of the crystals. This fumigant is not inflammable, and being non-poisonous can be freely handled without the slightest danger.

Lead Arsenate.—If purchased in stoneware receptacles it is a good plan to cover the cork and edges of any jars intended for storage with melted paraffin wax, as this will prevent the arsenate paste from drying too quickly.

Paris green.—Being a violent poison this should be kept under lock and key and out of reach of children.

Care of Hand Injectors.—Keep clean from dirt or corrosive matter; examine working parts at intervals and replace defective washers, &c.

Spray Pump.—Thoroughly rinse out the container with clean water before putting the pump away, and run plenty of water through the hose and nozzle. Keep clean and carefully oiled. Repair any leakage to hosing or defective washers.

PLATE 194.—MR. HARRY T. EASTERBY, DIRECTOR OF THE BUREAU OF SUGAR EXPERIMENT STATIONS.

(From a photograph taken a few years ago).

Born in 1867 at Echuca, Victoria, Mr. Easterby studied at the Horsham (Victoria) Public School, and applied himself to chemistry and microscopical science, including sugar chemistry, and entered the Sugar Factory at Maffra in 1897, where he studied the technology of sugar under Dr. Riesen, afterwards moving on to take up the position of Chemist with Messrs. Gibson and Howes, owners of the Bingera Sugar Plantation at Bundaberg.

Mr. Easterby was engaged by the Victorian Government to make investigations into the beet sugar industry in 1900 and part of 1901, after which he was appointed Assistant Director to Dr. Walter Maxwell.

Mr. Easterby subsequently became Director of Sugar Experiment Stations, which position he still holds.

The Sugar Experiment Stations during Mr. Easterby's long term of office have developed amazingly. At the time he joined the service there was only one Experiment Station in Queensland. Now there are three Experiment Stations, three Entomological Laboratories, a Sugar-cane Pathological Laboratory, a Sugar Soils Laboratory, and a Sugar Mill Technologists' Laboratory, while the staff has increased from six to twenty-one, including Chemists, Entomologists, Pathologists, and Agriculturists, while the yield of sugar has increased from 120,858 tons in 1901 to 520,620 tons in 1928.

SUGAR CROP PROSPECTS.

The Director of Sugar Experiment Stations, Mr. H. T. Easterby, has returned to Brisbane from a visit to some of the sugar areas comprising Cairns, the Johnstone and Herbert Rivers, Mackay, and Bundaberg.

Conditions in Northern areas were exceptionally dry following a prolonged and cold winter. Rain is badly needed in every sugar district. In spite, however, of the dry weather and grub damage the Cairns crop will be the largest ever harvested, the aggregate tonnage for the three mills—Hambledon, Mulgrave, and Babinda—being expected to reach 630,000 tons of cane, which will produce 90,000 tons of sugar. The young cane is standing up well to the dry conditions, and provided rain falls shortly the prospects for next year are excellent.

The crops at the Johnstone and Tully are also good this year, though Mourilyan is somewhat behind its usual tonnage. Here also the young cane looks well.

The commercial cane sugar in the cane is the highest ever experienced in the districts from Mossman to Lower Burdekin, due to the long spell of dry cold weather following the wet season. It is confidently anticipated that the tons of cane required to make a ton of sugar will be well under 7 in the North, and should be somewhere about this figure for the whole of Queensland. Last year it was 7.18, which was the lowest on record.

In the Herbert River district the farmers earlier in the year suffered from heavy and continuous rain which promoted a heavy growth of weeds, which they were unable to cope with in time.

The dry conditions appear to be much worse at Mackay than in other districts, and, with a good deal of frost, have caused a considerable reduction in the crop. It is now anticipated that the sugar yield for the seven mills will not be more than 75,000 tons.

CANE PESTS AND DISEASES.

The following report upon the Mossman sugar district has been submitted by Mr. J. H. Buzacott to the Entomologist at Meringa, Mr. Jarvis, and is now made available by the Bureau of Sugar Experiment Stations:—

From the economic entomological point of view, the Mossman district visited this month proved most interesting. The duration of this trip was mainly occupied in making a comprehensive survey of the area, and locating those parts most affected by grubs and other serious pests.

It is interesting to note that the weevil borer, which eight or ten years ago occurred commonly, has now practically vanished, presumably due to the efficient control exerted by the Tachinid fly parasite which was liberated in Mossman by Muir about the year 1910.

The distribution of the cane grub is diverse, but undoubtedly the most severe infestation occurs at Cassowary, where, on some farms, the damage has amounted to nearly half the crop, and, similarly to our experience in other districts, the cane suffers most on reddish volcanic soils. A fact which Mossman growers have noted, and which also fits in with former observations, is that the damage is usually more severe in fields that carry the highest standing cane at the time of beetle flight. The principal feeding trees of the beetle are the figs and the cocoanut palm, and very probably the guava, on which they have been seen clustering in great numbers. The flight occurs after the first heavy rain in November or early December, and seems to present no unusual aspects.

The frenchi grub does not appear to cause a great deal of damage, although it apparently has not yet risen to feed again after moulting. Wireworms are responsible for very considerable damage to germinating sets, and there appear to be two principal species, one of which is very slender, and the other being shaped more like the typical click-beetle larva. These wireworms were found burrowing all through young shoots under the surface of the ground, and some of the larger ones were boring in the main set like the beetle borer. On one farm over half an acre of plants died off owing to wireworms, and the block had to be replanted.

False wireworms (Tenebrionidæ) occurred commonly in the region of young plants, and were usually found just under the surface of the soil. Whether they were causing appreciable damage, however, is problematical.

The only other pests causing notable damage were moth borers and army worms. Of the former, both the large moth borer (*Phragmatiphila truncata*) and the small ratoon borer (*Ephysteris chersæa*) were much in evidence, and the cause of numerous "dead-hearts" among young ratoon cane. These borers were usually present where weeds were growing through the cane and on the headlands. At one place a curious type of damage occasionally associated with the large moth borer was seen; the caterpillars had gnawed a deep depression through the rind of the stick, and where this occurred the stick would frequently snap off. This was noted in a standing crop of Clark's Seedling, and the injury was as often to be seen at the base of the stick as at the top where the moth borer usually dwells.

With regard to the army worm, several fields of young plant cane had been well stripped, and the fact of the caterpillars having lived in the centre leaves of the plant and of their main feeding taking place at night, points to the agent being *Cirphis unipuncta*, which is the commonest of the army worms affecting sugar-cane.

Of the minor pests aphides and linear bugs were the only ones occurring in large numbers.

It is intended if possible to fumigate a small plot of grub-infested cane early next year to demonstrate to Mossman growers the efficacy of fumigation as a means of combating the cane grub.

Thanks are due to the Mossman mill staff, representatives of associations, and farmers, who gave every assistance during the visit.

The Director of the Bureau of Sugar Experiment Stations has received the following report covering the period September to October, 1929, from the Entomologist at Meringa, Mr. Edmund Jarvis:—

Notes on the Oviposition of *Lepidoderma albohirtum* Waterh.

During last December some original research work was carried out at this experiment station in connection with the egg-stage of our "greyback" cockchafer. This interesting study which was commenced at the beginning of the aerial life of the beetle in question, consisted of collecting quantities of living cockchafers from the foliage of their feeding-trees, separating the sexes and confining each female specimen in a suitable cage containing about 16 cubic inches of moist soil, prepared in a manner calculated to induce the captive to lay eggs.

About 500 females were treated in this way between the dates 19th November to 29th December; such collecting—coupled with that of several hundred additional specimens made use of for other experiments during the same period—affording opportunity for acquiring further data on percentages of the sexes in *albohirtum* occurring at different times in the flighting season.

It was found that beetles captured from six to ten days after emergence from the ground oviposited more freely than those which had not been allowed to remain more than three or four days upon their food-plants. Many specimens which had been confined in cages a day or so after leaving the soil died without laying any eggs; these being replaced about a week later by females which had been on the wing for nearly a fortnight. Eggs were first noticed amongst the soil in cages about 12th December, these hatching twelve to fourteen days later; while the total number of tiny grubs procured by this method of rearing was 1,226. During the fourteen days occupied by the egg condition the average shade temperature at our laboratory was 80.25 degrees Fahr.

As a result of investigations made by the writer it appears that tiny grubs of *albohirtum* during their first instar are very easily killed by abnormal earth pressure, such as that brought about by cultivation of the soil in their immediate vicinity. Possibly, sudden pressure of coarse particles of earth on all sides of the body not only tend to prevent movement through the soil but would also be likely to cause more or less injury to the skin, which at this early stage of growth is softer and more delicate than that of grubs of the third instar.

Under natural conditions these tiny newly-hatched grubs enter the soil overhead by gradually tunnelling through the wall of their egg-chamber, so that, during the course of such subterranean progression in compact earth, they would not at any time be subjected to earth pressure.

Grubs Destroyed by Cultural Operations.

Some years ago, when quantities of grubs were collected from canefields almost every day throughout a period of about seven months (December to June) for experimental work at Gordonvale laboratory, I found that no matter how carefully they were handled during transference from the freshly ploughed furrows to large tins containing moist earth, a fairly large percentage (fifteen to twenty) of apparently healthy-looking and uninjured third-stage grubs did not live more than a day or two in confinement. It was concluded that those dying in this manner had been subjected to more or less soil pressure, or received a severe jar to the body during the breaking up of the ground. An additional number (about 8 per cent) of those which happened to lie close to the path of the plough-share, and were either cut or badly squeezed, died almost at once, and were, of course, left in the furrow after identification of the species concerned.

In a report made by Mr. Tryon twenty years ago (1909) with regard to the occurrence of dead grubs in the Isis district, he points out that a certain percentage of fatality amongst cane grubs "invariably attends the use of agricultural implements," and that "a number are also injured by simple percussion and bruising without any actual contact having taken place." Needless to say, the opinion of such an authority as Mr. Tryon on this matter is of exceptional value. Seeing that his remarks applied to fully-grown, third-stage grubs of *Lepidoderma albohirtum*, we may rest assured that the mortality noticed by him at the time would have been considerably higher had these larvæ been in the first instar or stage of development.

Common-sense control methods of keeping the soil moving between cane rows as much as possible during those periods taken up by the egg and early larval conditions of our "greyback" cockchafer are within the reach of all farmers, and have already been advocated as being advantageous (Bul. No. 19, pp. 58, 59).

One of the most important factors associated with ideal development of plant life, no matter whether of fruit, vegetable, or sugar-cane, is that of conservation of moisture, and this can only be secured by a systematic cultivation of the upper 3 or 4 inches of soil about a couple of days after each downpour of heavy rain, in order to break up the freshly caked surface and so form a layer of loose, fine earth to act as a mulch and stop evaporation of the moisture lying below it. Each time the ground is disturbed in this manner a certain number of cockchafer eggs or small grubs are likely to be destroyed by soil pressure, &c., while, at the same time, when breaking tunnels containing uninjured grubs, several of these are in danger of falling a prey to ants or other enemies before they are able to barricade themselves against such danger.

In this connection I would also remind growers of a fact, already alluded to in previous monthly reports, that egg-laden female cockchafers are disinclined to oviposit in well-worked soil having a surface composed of loose particles, since such scarabæid beetles, while living under natural conditions, are accustomed to tunnelling into hard ground, which, by affording a kind of fulcrum to work against, enables these insects to maintain a correct position during the course of digging in. (See Bul. No. 19, p. 58.)

The Assistant Entomologist at Mackay, Mr. A. N. Burns, has submitted the following report for the month ended 12th November, 1929, to the Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby:—

Greyback Beetles Fully Developed (*Lepidoderma albohirtum* Waterh.).

Observations made during the past two weeks have shown that greyback beetles are now fully developed and resting in their cells awaiting the advent of favourable rains to enable them to emerge from the ground. The long continued dry season has rendered the ground very hard and dry in many places, therefore the emergence of beetles may not be expected until fairly substantial rains have fallen. On the other hand, if the dry weather should continue for a further few weeks, it will very likely exercise some degree of natural check over this pest in that many beetles may die through being confined in their cells too long.

In the far northern cane areas this form of natural check occurs every few years, but usually after a comparatively small flight of beetles, grub damage the following season is severe. This is explained in the restoration of natural balance—i.e., when an insect is plentiful its parasites are also plentiful, and thus a control takes place; but in seasons of comparative scarcity parasites too are scarce, and so the species tends to increase. This is supplemented by many other factors, such as more equal division of sexes, which produces a greater proportion of fertile eggs, and weather conditions, &c.

Growers are recommended to collect and destroy beetles from feeding trees, also to clear away from headlands and near canefields, any feeding trees. The principal trees that are most attractive to beetles are wild figs (*Ficus* spp.) of all species, Moreton Bay Ash (*Eucalyptus tesselaris*), Blue Gum (*E. tereticornis*), and the swamp "Beetle Tree" (*Philanthus* sp.), as well as wattles or acacias of all species (*Acacia* sp.). Judicious collecting of beetles and clearing out of feeding trees from the immediate vicinities of canefields is a very helpful factor in reducing the numbers of this pest. High grass on headlands and canefield roads is particularly attractive to beetles, and as is usually the case, the ground in these situations is very hard and consolidated which prevents the beetles from entering to lay their eggs in those spots, therefore they enter the loose cultivated ground immediately adjoining. This is not intended to mean that the cane would not be affected at all if the grass was cut down, but high grass is a great attraction to beetles and would no doubt tend to greatly increase the subsequent grub infestation, therefore it may be seen that such precautionary measures are helpful.

False Wireworms *(Gonecephalum carpentariae?* Fam. *Tenebrionidae).*

Many growers may have noticed during the past two or three months large numbers of small, dirty, blackish-brown beetles running about the canefields and headlands. The larvæ or grubs of this beetle are of the "wireworm" type, and are at present very numerous in some canefields in the Mackay district, and several farmers have recently brought under notice their occurrence in large numbers amongst young cane, where they were found to be destroying the buds or eyes on the sets. They enter the eyes and eat out the whole interior, thus producing many misses in the cane. In consequence, many farmers have had to supply parts of their cane, in some cases as many as three times. When supplying by hand, dipping the sets in a solution of sodium arsenite, molasses, and water in the proportions of sod. ars. 1 lb., molasses 8 lb., and water from 8 to 10 gallons, is recommended as a control measure. The dipped sets should be planted wet so that the earth will adhere to them; this soil then becomes impregnated with the poison, thus any insect attacking the sets will first come in contact with a small amount of poisoned soil before actually reaching the set, and will thus be influenced by the solution. The cut ends of the sets will absorb the poison to a depth of a quarter of an inch or thereabouts.

The false wireworm may be briefly described as follows:—When fully grown about three-fifths of an inch in length (1.5 cms.), elongate, and cylindrical. Colour dirty yellowish-brown, the head and first two segments smoky brown, also the anal and pre-anal segment. If seen under a magnifying glass the edges of the anal segment will be seen to have a row of small black bristle-like spines which are slightly curved upwards, bordering its outer edge. The head is small, dark brown, and semi-retractile. The first three body segments each carry a pair of short legs, which are also dirty yellowish-brown in colour. The body is twelve segmented. These larvæ are able to move fairly rapidly on their ventral surfaces; sometimes when dug up they partly curl up and remain motionless for a couple of seconds, or else wriggle themselves with a lashing motion several times before attempting to re-enter the soil. The duration of the larval or wireworm stage of this insect occupies from six to eight weeks during the spring months.

The pupa is a dirty cream colour, and measures about two-fifths of an inch in length (9 cms.). It resembles the adult beetle in shape, with the legs and antennæ neatly folded on the ventral surface, the elytra or wing covers are enclosed in two bud-like processes which are also directed towards the ventral surface. The anal segment bears two fairly long outwardly curved spin-like processes. Just before emergence the eyes darken and the body assumes a dark-brown colour. The duration of this stage is from ten to twelve days, and the pupa is enclosed in a small oval cell in the soil.

The beetles appear to be fond of congregating under rubbish, &c., and heaps of freshly-pulled weeds have been recommended as being effective traps for attracting them. Night time has been recommended as being the best time to remove the beetles from the traps; any thus collected may be destroyed.

Linear Bugs *(Phaenacantha australicus* Kirk.*).*

The spring generation of these bugs is now beginning to appear; very small nymphs being observed during the last two weeks. These slender almost mosquito-like active insects are very plentiful in many parts of the district in the late summer months, but it was not definitely known how many broods of this bug were produced in a year.

The presence of very young nymphs at the present time appears to indicate that there are three broods normally—there may be slight overlapping into a fourth brood—but nymphs have now been observed freely during the months of November, January and February, and May and June. Examples bred at the Laboratory have shown that the adults hibernate under cover of trash, &c., during the winter months, eggs are laid about October, the young bugs from them hatching during the latter part of that month and early November. The young nymphs noted in January and February are the offspring from the spring generation, whilst those found in May and June are the brood following the summer generation; these hibernate until the following spring and produce the spring brood.

The eggs are recorded as being dropped loosely and unattached on the surface of the ground; examples caged at the Laboratory invariably laid their eggs singly and attached to various objects, some being laid on the sides of the breeding cage. The eggs are much longer than broad, being a little over 1.5 mm. in length by 0.4 mm. in width. They are of a dark red-brown colour, and the incubation period occupies about twelve days.

This cane insect, although at times very abundant in canefields, has so far not called for control measures; it appears to be fairly free from natural parasites and other enemies. Occasionally, the apices of cane leaves in fields where the bugs are abundant assume a yellowish colour due to the continual drain of sap as a result of the bugs feeding.

The Assistant Entomologist, Bundaberg, Mr. R. N. Mungomery, has submitted the following notes for publication, on the emergence and collection of certain injurious cane beetles, to the Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby:—

Beetle Emergence Expected.

During either November or December, as soon as we have received sufficient rain to penetrate to the harder subsoil, we may anticipate the emergence of the various beetles whose grubs attack our cane crops. In Southern Queensland the three worst grub pests with which we have to contend are the Childers, Bundaberg, and "Frenchi" cane grubs, which, of course, result from eggs laid by their respective beetles soon after their emergence and flighting period.

Up to the present our investigations have shown the many difficulties involved in the wholesale collection of female beetles of the two former species, and although further investigation work is in progress, with a view to trapping the females before they can fly away to lay their eggs, past experience in this connection has shown that the number that can be caught is by far too small to have any appreciable effect in diminishing the degree of infestation from year to year. Accordingly, the following remarks on the collection of beetles are not applicable to the Childers or Bundaberg beetles, but concern chiefly the "Frenchi" beetles. In controlling the two former pests, we aim at cleaning the fields thoroughly by hand picking previous to planting, and if the crop becomes subsequently infested, this practice is then supplemented by soil fumigation.

"Frenchi" Beetles.

"Frenchi" beetles are about 1 inch in length, and less than half an inch at their greatest width. They are of a pale reddish colour, and are covered with whitish scales which give the beetles a silvery lustre. On account of this silvery appearance they have been sometimes erroneously called "greyback" beetles, but it should be here noted that the "greyback" beetle, which does such a vast amount of damage to cane in North Queensland, does not occur here, and therefore to avoid confusion the term "frenchi" beetle should be rigidly adhered to. In collecting this species advantage is taken of certain peculiarities in their habits.

How they are Collected.

In this case the female beetles fly to low shrubs, fences, and even to the young cane stools, where they are followed by the males, and mating then takes place. The beetles then remain suspended from the objects to which they have flown, and they may be collected without any difficulty. After mating, if unmolested, they may feed on the foliage of such trees as the Moreton Bay Ash, bloodwood, &c., and before dawn they fly back to the canefields to enter the soil and deposit their eggs.

"Frenchi" beetles are not attracted to lights in large numbers like some of the other common beetles, and lights are necessary chiefly as a means of locating and collecting mating pairs. If such collecting is carried out, the collector is assured that equal proportions of the sexes are present, with the additional satisfaction of knowing that every pair destroyed means at least thirty potential grubs less to feed on his crops in the following years. Although the life cycle of "Frenchi" is of two years' duration, there is an annual emergence of beetles, and in some areas there appears to be a larger emergence every second year, with a corresponding heavier infestation of grubs in the succeeding year.

Where to Look for Beetles.

This year, in some of the sub-districts of Bundaberg, there should be a fairly heavy emergence of "frenchi" beetles, and it behoves growers to collect these beetles as thoroughly as possible in order to minimise damage during the 1930-31 spring and summer. In past years grubs from these beetles have been found on a few farms at Elliott Heads, Avoca, Oakwood, and Gin Gin, and this note of warning is issued with the view that farmers might take the necessary precautions to prevent their fields again becoming infested.

PATHOLOGICAL INQUIRIES.*

By J. H. SIMMONDS, M.Sc., Plant Pathologist.

Of the many specimens submitted for report a considerable number are found on opening up to be more or less unfit for enabling a proper determination of the cause of the trouble. This position usually arises from one or more of the three following causes:—

1. The specimens have rotted during transit and are unfit for examination.
2. The portion of the plant in which the causal agent might be found is not included.
3. There is not sufficient data given regarding the general growing conditions of the plant, in which conditions, in many cases, is found the origin of the trouble.

To aid those desirous of seeking advice, a few hints regarding the submission of specimens are given below:—

The method of packing will depend largely on the nature of the specimen and the time that it will take on its journey.

When the parcel may be expected to reach its destination in not longer than two days, the specimens, whether of foliage or fruit, can be wrapped separately in clean newspaper and packed in a cardboard box to avoid crushing. An airtight container must be avoided, as the material sweats and quickly rots under such conditions.

For long-distance consignment, foliage is best pressed between sheets of blotting paper, which can be posted enclosed between two pieces of cardboard. When wishing to send succulent fruit, such as are liable to arrive in a state of decomposition, it is sometimes possible to cut off the diseased portion in a thin layer and send this wrapped in clean blotting paper as in the case of foliage.

When possible, specimens illustrating the disease in all stages, including both early and late symptoms, should be sent.

If the disease consists of a definite leaf or fruit spot, only that portion of the plant affected need be included. However, in the case of diseases of a more general nature, such as a wilt or dieback, it is necessary to forward specimens of the whole plant, including especially the roots. It is always best to include whole specimens when dealing with small herbaceous plants or seedlings.

A covering letter should be sent indicating the date on which the specimens were posted, and stating the nature of the information required. As far as possible, the following details should be included also, to facilitate a correct diagnosis of the trouble:—

(*a*) A short description of the disease as it appears in the field; the varieties of plant affected; the date of first appearance; and nature of subsequent spread, &c.

(*b*) Nature of the soil and subsoil and drainage; details of any manurial application; and date of application.

(*c*) Particulars regarding rainfall, frosts, &c., occurring during the life of the crop.

(*d*) The strength and time of application of any sprays used.

(*e*) Any contributing cause which might suggest itself to the grower.

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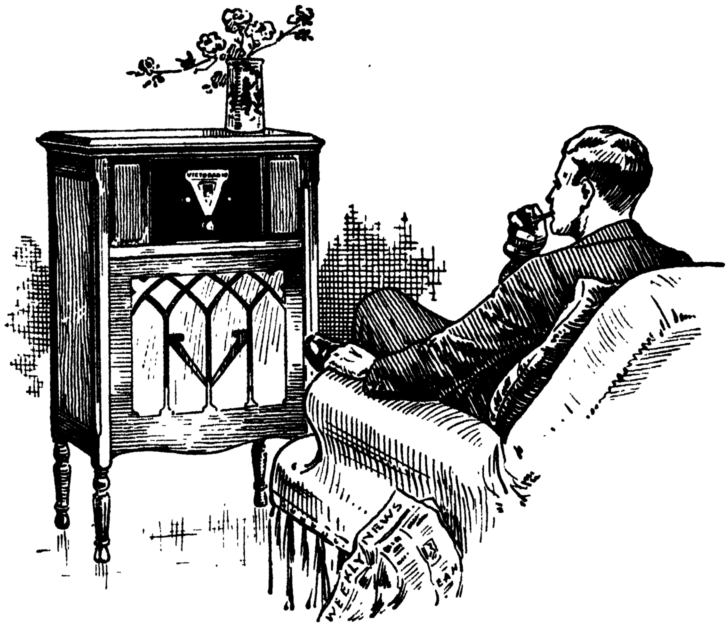
* Reprinted from "Pests and Diseases of Queensland Fruits and Vegetables," by Robert Veitch, B.Sc., F.E.S., and J. H. Simmonds, M.Sc., published by the Department of Agriculture and Stock, Brisbane, 1929.



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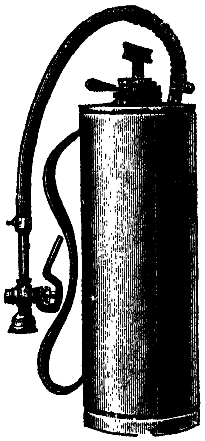

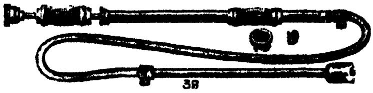

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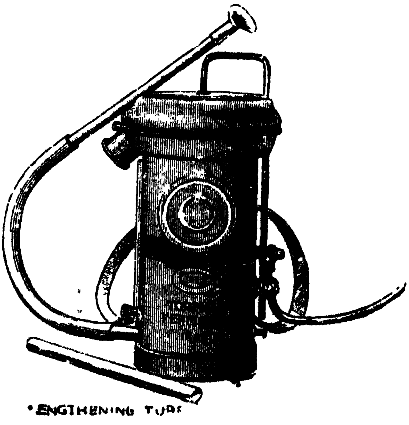

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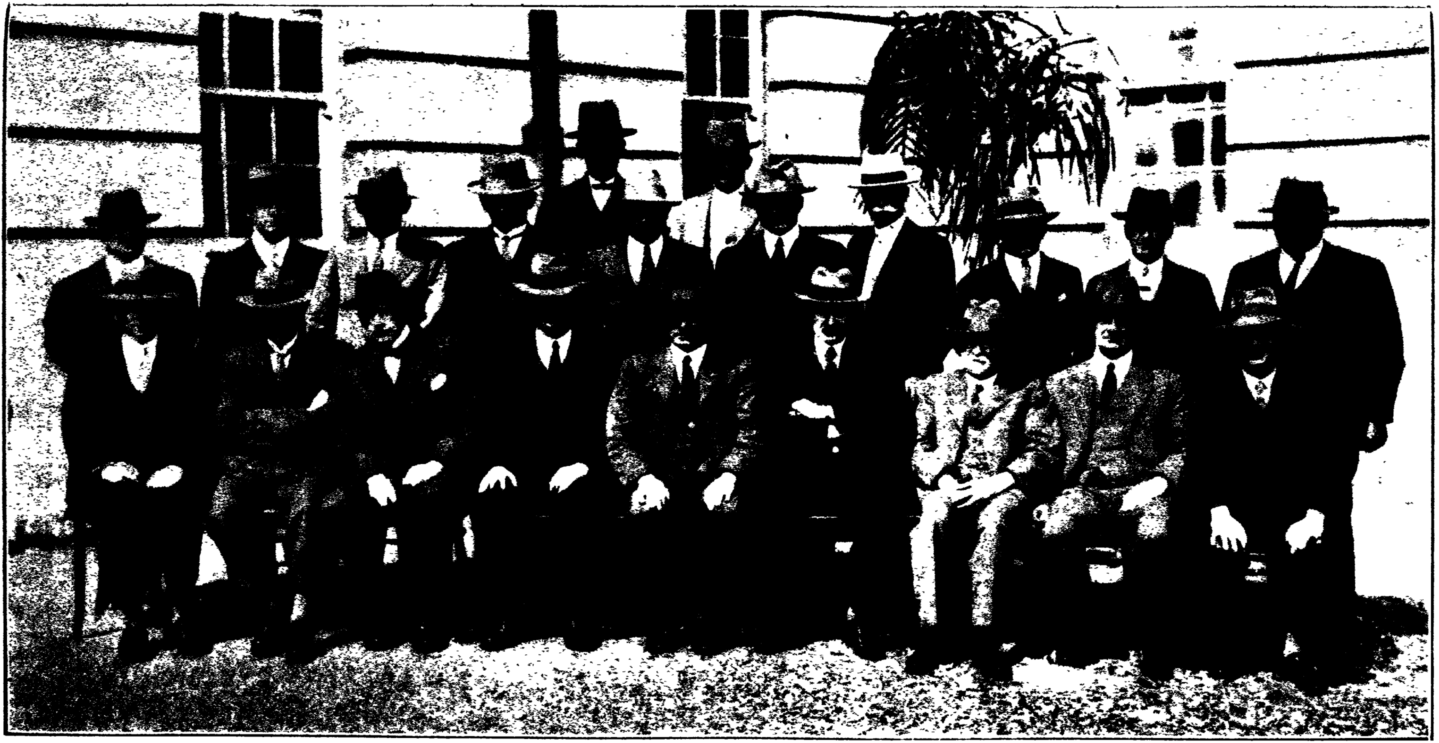

PLATE 195.—CONFERENCE BETWEEN QUEENSLAND WHEAT BOARD AND FLOUR MILLERS, SEPTEMBER, 1929.

Top :—Messrs. W. Binns and J. H. Allison.

Standing :—Messrs. R. M. White, W. R. Dean, A. C. Krieg, B. C. C. Kirkegaard, R. T. Phelps, J. Archibald, A. Hoskin, E. F. O'Brien, W. D. Phie and J. Canavan.

Sitting :—Messrs. W. G. Hamilton (Assistant Crown Solicitor); L. R. Macgregor (Director of Marketing); J. T. Tod, Hon. W. A. Deacon, M.L.A. (Minister for Public Lands); Hon. H. F. Walker, M.L.A. (Minister for Agriculture and Stock); Messrs. R. J. Archibald, G. P. Barnes, M.L.A.; W. H. Luya and T. P. O'Brien.

RURAL ROUTES IN QUEENSLAND.

THE WORK OF THE MAIN ROADS COMMISSION.

The Eighth Annual Report of the Main Roads Commission commends itself strongly to all concerned with the progress of country life in Queensland.

This survey of a year's achievements leaves the impression that the Commission is one of the most important factors in our rural development. It is a record of well-organised work, and through the courtesy of the Commission we are able to reproduce the series of excellent plates with which the Report is illustrated, and which indicate to some extent the immense value of a great community service.—EDITOR.

THE ROAD AND THE NATION.

ONE of the most important aspects of the history of civilisation is the development of the road for in a very real sense "transportation is civilisation." Writing in the "Edinburgh Review" some time ago, H. J. Randall tells us that "the literature of the road is curiously scanty. It provides the commonest of metaphors, but is one of the rarest of subjects. Poetry, imaginative prose, religion itself, would lose much if they were deprived of such convenient symbols as the broad road, the narrow path, the beaten track, and the accustomed way." And again, civilisation "begins with wandering trails in the dim mists of pre-history; its present stage is the proposal to erect solid structures of concrete reserved for fast motor traffic; between the two lies the material history of mankind." The same writer goes on to remind us that in the story of our race there have only been three periods of deliberate and systematic road making. "The first was the Roman era, and the Romans, according to universal opinion were the greatest of all road builders. The second great period was that of the industrial revolution at the end of the eighteen and beginning of the nineteenth centuries. It transformed England as an agricultural country to one primarily industrial, with agriculture as a subordinate industry. It shifted the centres of population from the wheatfields to the coalfields; from the south and east to the north and west. The sparsely populated areas became hives of industry, and the enormous increase in wheeled traffic threw a burden on the medivæval trackways."

"Telford's masterpiece, the great Holyhead road, will probably endure as long as Watling street; and his unexecuted plan for a great north road may be accomplished in our own days. But about 1830 the 'calamity of railways' fell upon the land, and for the remainder of the nineteenth century there was no great road making; in fact, the roads were comparatively neglected. The third great epoch is the present, dating from the perfection of the motor-car in the last years of last century which has filled our roads as they were never filled before . . . . ."

Writing on the same theme Hilaire Belloc observes that "the Road is one of the great fundamental institutions of mankind. . . . Not only is the Road one of the great human institutions because it is fundamental to human existence, but also because its varied effect appears in every department of the State. It is the Road which determines the sites of many cities and the growth and nourishment of all. It is the Road which controls the development of strategies and fixes the sites of battles. It is the Road that gives its framework to all economic development. It is the Road which is the channel of all trade, and, what is more important, of all ideas. In its most humble function it is a necessary guide without which progress from place to place would be a ceaseless experiment; it is a sustenance without which organised society would be impossible; thus, and with those other characteristics I have mentioned, the Road moves and controls all history."

As a factor in building up the same sort of rural civilisation in Queensland the importance of the Main Roads Commission will be admitted and the following summary of its operations for the year contains much of interest to our readers.

SUMMARY OF OPERATIONS.

Road Gazettals and Works.

In the course of the year a length of 619 miles of Main Roads was gazetted, and of Developmental Roads 54 miles, making the total lengths gazetted at 30th June 6,195 and 416 miles respectively.

Road construction as scheduled and as described in the report of the Chief Engineer, has made substantial progress throughout the State during the year.

Several bridges of very considerable magnitude and importance are in hand, such as Macrossan Bridge over the Burdekin River, in Dalrymple Shire, the length of which is 1,188 ft. and width 16 ft.; Halifax Bridge over the Herbert River at Halifax, in Hinchinbrook Shire, the length of which is 950 ft. and width 12 ft.; Burdekin Bridge, between Ayr and Home Hill, the length of which is 450 ft. and width 12 ft., together with extensive approaches over sandy river bed, upon portion of which chain netting is being fixed; Coomera River Bridge on the Main South Coast road, the length of which is 735 ft. and width 20 ft. The river spans of this bridge will consist of broad flanged steel beams, surmounted by a reinforced concrete deck, and resting upon concrete piers founded upon cylinders and pile foundations. The southern approach viaduct consists of timber spans. The bridge should be completed during the early part of 1930, and will relieve the congestion caused by the existing ferry. The Albert River Bridge over the Albert River, in Burke Shire, the length of which is 369 ft. and width 12 ft., is well in hand.

Development in the North.

Particular reference is made in the Report to roads under construction on the coastal districts of the North and Central area, such as Daintree-Mossman road. Two important bridges have been completed thereon, the one over Saltwater River being a dual purpose structure which will carry both the sugar-cane tramway and road traffic. Dairying has now been established in the Daintree area, and the construction of the road in question should greatly help to stabilise the industry. This area is the farthest north in Australia in which dairying is carried on. The river flats are carrying one and a-half cows to the acre, due to the rich pastures of marram grass and the heavy annual rainfall of over 100 in.

The dairying industry is being established in two other tropical districts—viz., at Silkwood, near Innisfail—where a start has been made on roads to feed the factory. It is hoped that a vigorous road and bridge construction policy can be continued in the area which has much undeveloped land suitable for dairying and fruitgrowing, quite apart from sugar-cane.

At Mackay a butter factory is in course of establishment, and the Kungurri-Mount Ossa and Calen-Cameron Pocket roads have received considerable attention, which it is also hoped to continue. These roads serve new settlements devoted to sugar, fruit, and dairying.

A New Link with New South Wales.

The mountain section of Brisbane-Mount Lindesay road, and which is destined to become a most important link with New South Wales, has been completed in Queensland, but the New South Wales section to Woodenbong is yet under construction, having been delayed by wet weather.

Very considerable benefit will accrue to both States when the road is finally opened.

Kingaroy to Bell.

The completion of the Bunya Mountain section of the Kingaroy-Bell road has removed one of the greatest difficulties to traffic on this important link between the Downs and the Burnett, but the metalling of some miles of black soil in Wambo Shire to Haly's Bore is very necessary, whilst the construction of about 5 miles between Kumbia and Porter's Gap, in Kingaroy Shire, is equally urgent. The necessary bridges over the Boyne River and Mannuem Creek are in hand.

On the South Coast.

The completion of the Main South Coast deviation leading into Southport is eagerly awaited, but the opening of the first section has alleviated the difficulty of travel between Saltwater Creek and Southport very considerably.

Serious coast erosion has taken place at Currumbin, and steps are being taken to give reasonable access pending the construction of the permanent road, which deviates from the existing road at Currumbin Bridge, and after crossing a spur rejoins the existing road near Tugun.

Considerable expense has been caused by erosion at the Narrow Neck, south of Southport Bridge, but the effect of the brush fences and groynes minimised the erosion to a considerable extent.

Other Important Highways.

The Brisbane-Toowoomba road construction has proceeded continually throughout the year, and it is hoped that all serious bogs on the road will have been eliminated in another eighteen months.

This road is of a highly useful character to the agriculturist and dairyman throughout its whole length.

Further works on the Clifton-Hirstvale-Grantham road will be completed as far as King's Creek, some miles from Clifton, before the end of the financial year 1929-30. This road, whilst being of great assistance in development of the adjacent area, has a very considerable value as a link between the Downs and Lockyer districts.

A number of important bridges more fully described in the report of the Chief Engineer have been completed and opened for traffic during the year under review, including that over the Don River, near Bowen, 730 ft. long, which gives road access to Bowen Port and Railway to the country on the north bank of the river.

Other completed bridges of importance in the pastoral areas are Bulloo River Bridge, near Thargomindah; Warrego River Bridge, near Wyandra; and Barcoo River Bridge, near Isisford—all of reinforced concrete.

The composite road and sugar tramway bridge over the Haughton River, on the Ayr-Townsville road, has been completed, and withstood a severe flood.

Kolan River Bridge, on the Gin Gin-Miriam Vale road, gives relief from a difficult and often uncrossable ford.

The low-level timber bridge and concrete causeway over the Burnett River at Mingo is one of the most important works constructed in the Burnett area this year.

In most instances tenders have been called by Shire Councils whose recommendations are subject to review before approval is granted by the Commission and confirmed by the Minister.

The standard of work which has been achieved is very close to that aimed at in the specifications, and in general the shire officials and Commission's officers are to be commended upon the result.

Maintenance.

Maintenance works have been carried on over 6,000 miles of road, including the bridges thereon, the total expenditure being £180,596 in 122 local authority areas.

A considerable amount of road-widening has been carried out under this heading on roads in the vicinity of the metropolitan and some of the provincial city areas, owing to the great increase in traffic.

The maintenance of a number of roads is carried out under direct supervision of the Commission in cases where a number of local authorities are interested in the road.

Road Construction Investigation.

The policy of experimenting with new methods of construction and investigating and trying out various types of road is being continued.

Further experimental sections of penetration macadam roads, using emulsified bitumen and native asphalts in varying quantities and with different treatment, were laid down upon the main Ipswich road.

A small section of the old river gravel on the main Gympie road near North Pine railway bridge was scarified and treated with bitumen, the mixing being carried out by a power grader, and the consolidation being partly by power roller and partly by traffic. The results have been encouraging, and a further section will be laid to confirm the results.

Arrangements have been made for the construction of a heavy trafficked section of the Ipswich road by the Sunderland cement penetration method, particularly with a view to ascertaining the minimum thickness which can be utilised without risk of early failure (a good foundation will be insured).

The Chief Engineer made extensive investigation during the year of road construction in the States of New South Wales, Victoria, and South Australia, the results of which have been disseminated to the staff and shire councils.

Tourist Roads.

Provision has been made for the declaration, construction, and maintenance of tourist roads upon terms to be agreed upon between the Commissioner and the local authorities concerned, provided that in certain instances no charge might be made to the local authorities—all subject to the approval of the Governor in Council.

It may be mentioned in passing as an example that the Public Highways Department of the Province of Ontario, Canada, estimates the value of the tourist traffic from other countries at £7,000,000 for the year 1926.

Commissioner's Inspections.

In the course of the year visits of inspection were made to a number of local authority areas, with whose representatives the future road requirements were discussed, and as the result of which plans have been developed. These included Herberton, Tinaroo, Eacham, Cairns City and Cairns Shire, Johnstone, Cardwell, Hinchinbrook, Thuringowa, Townsville City, Dalrymple, Ayr, Pioneer, Sarina, Fitzroy and Livingstone, Maryborough, Burrum, Woongarra, Kolan, Bundaberg City, and Isis.

Plate 196.

Mechanical Navvy in use by the Commissioner on Main Roads Works.

The important decision as to the route of the connection between Bundaberg and Childers was finalised as the result of this inspection.

The Shires of Pine, Caboolture, Landsborough, and Maroochy were visited, and also the whole of the shires south from Brisbane to the Border and westward to the Range.

An inspection through Kingaroy, Wambo, Chinchilla, Taroom, Bendemere, Murilla, Bungil, and Roma was made during the summer, and also the whole of the Darling Downs area.

Visits of inspection to remote areas not included above have been made by senior officers.

It will thus be seen that the Commission is fully in touch with the road needs of the State and the views of the local authorities.

PLATE 197.

UPPER HERBERT RIVER BRIDGE, HINCHINBROOK SHIRE, NORTH QUEENSLAND. LOOKING FROM THE NORTH SIDE.

This bridge has been subjected to heavy flooding without damage.

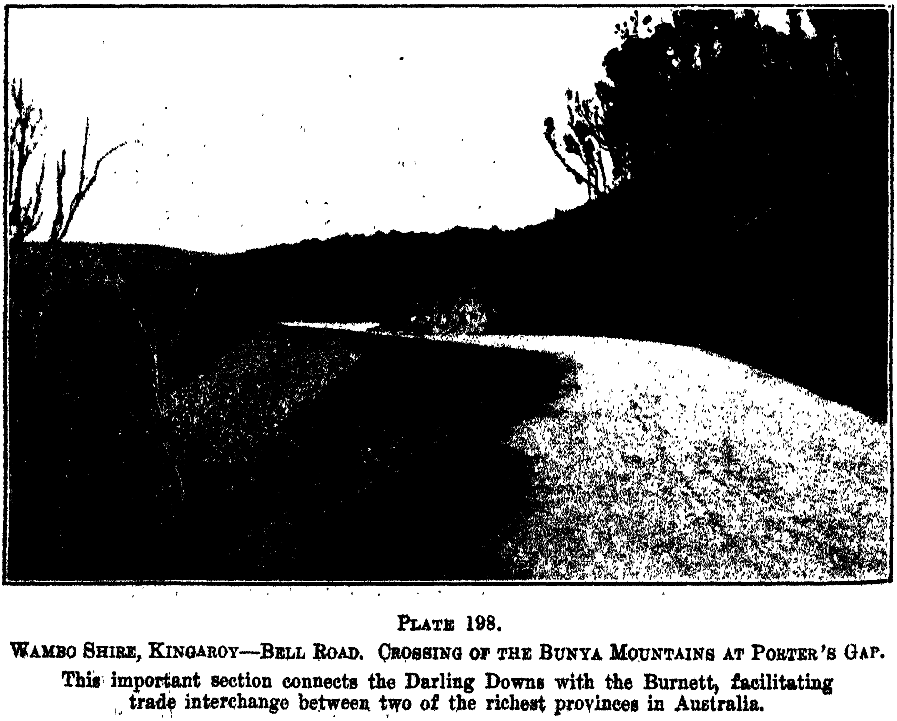

PLATE 198.

WAMBO SHIRE, KINGAROY—BELL ROAD. CROSSING OF THE BUNYA MOUNTAINS AT PORTER'S GAP.

This important section connects the Darling Downs with the Burnett, facilitating trade interchange between two of the richest provinces in Australia.

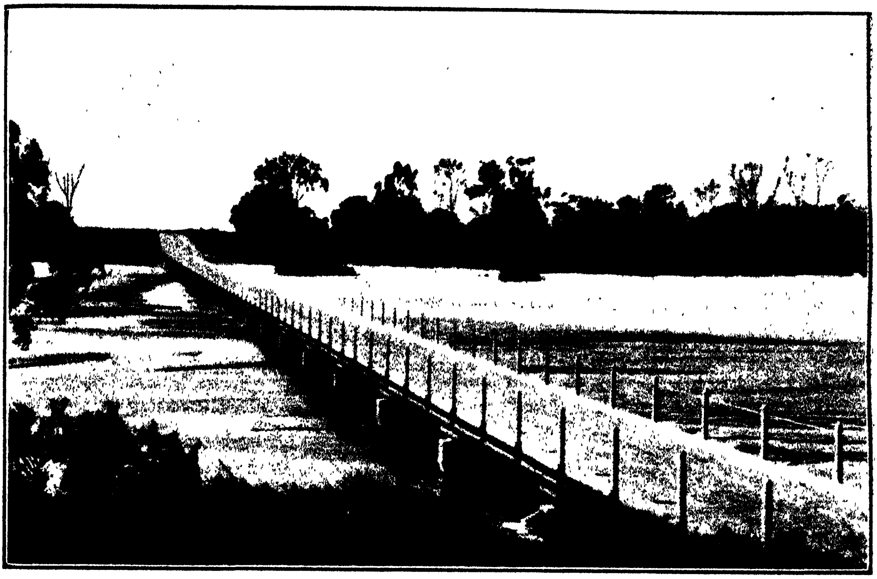

PLATE 199.

WANGARATTA SHIRE. LOW-LEVEL BRIDGE OVER THE DON RIVER, NEAR BOWEN. REINFORCED CONCRETE SUBSTRUCTURE AND TIMBER SUPERSTRUCTURE.

This bridge gives connection to all country north of Bowen. Length, 730 feet; width, 18 feet.

PLATE 200.

THE OLD DON RIVER CROSSING NOW REPLACED BY THE BRIDGE SHOWN ABOVE. THE FLOOD LEVEL REACHES THE TOP OF THE BANK.

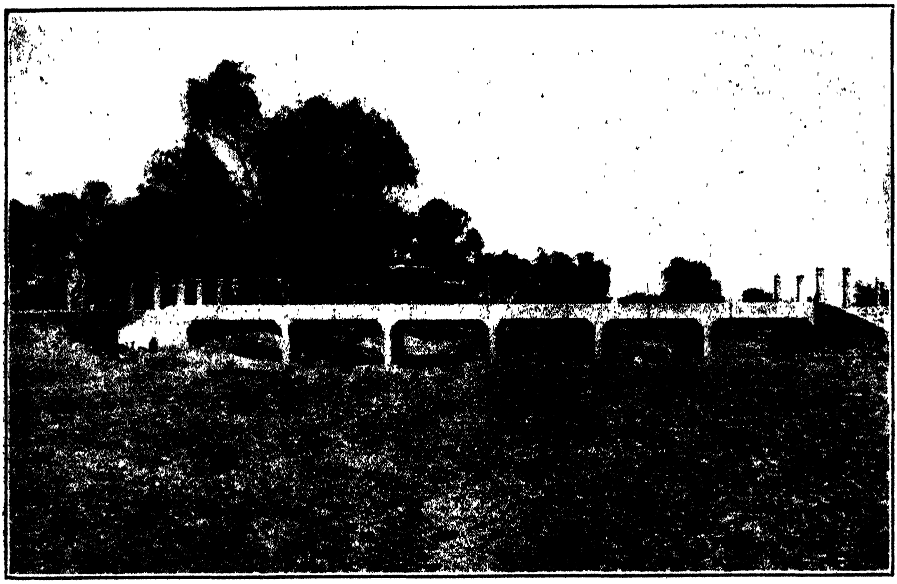

Plate 201.

Cunnamulla—Thargomindah Road, Bulloo Shire. Multiple opening reinforced concrete culvert over the western channel of the Bulloo River.

A flood section of native bitumen road extends for approximately a mile adjacent to the main Bulloo River.

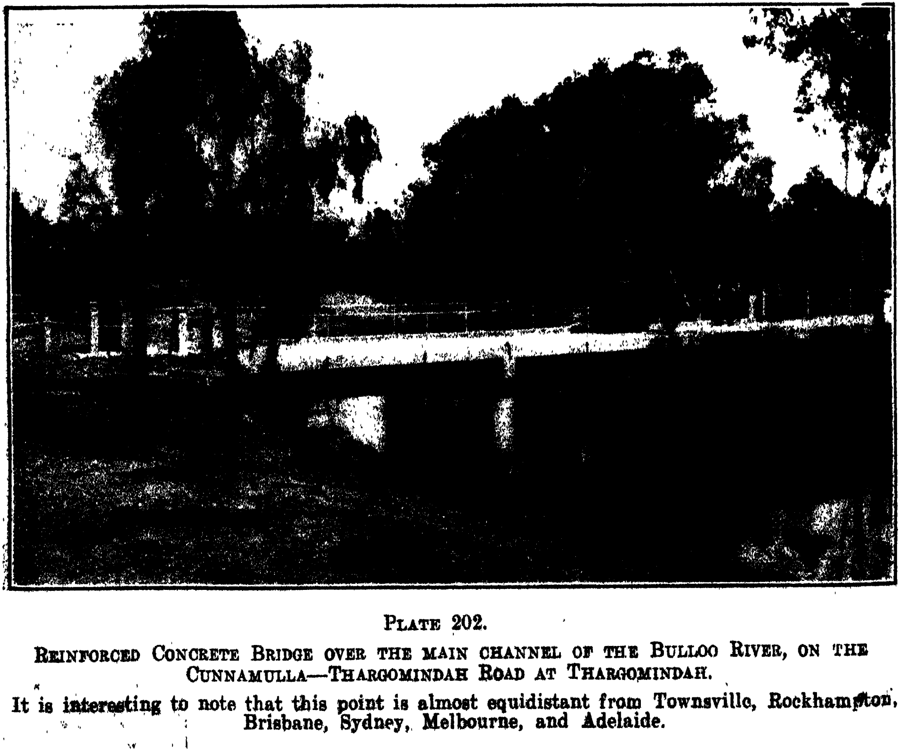

Plate 202.

Reinforced Concrete Bridge over the main channel of the Bulloo River, on the Cunnamulla—Thargomindah Road at Thargomindah.

It is interesting to note that this point is almost equidistant from Townsville, Rockhampton, Brisbane, Sydney, Melbourne, and Adelaide.

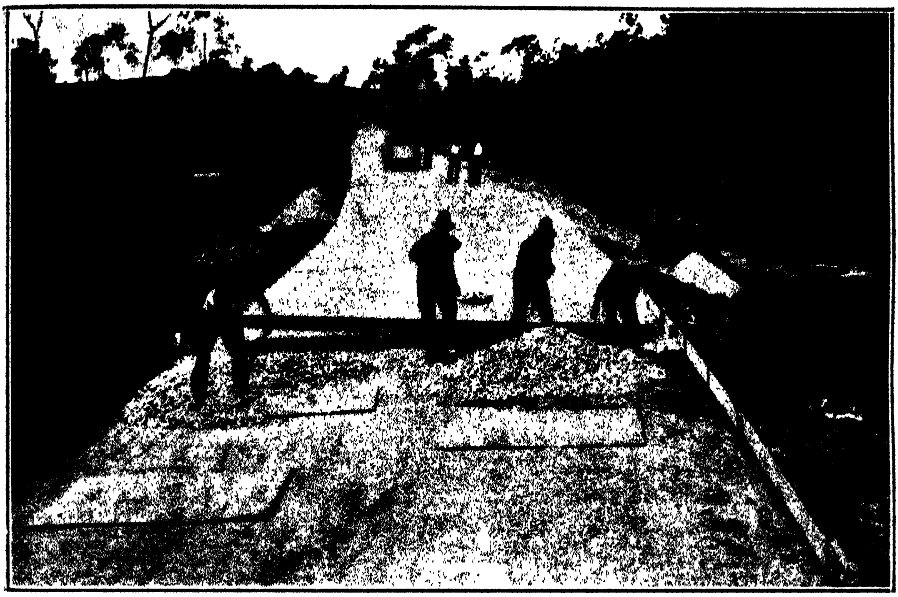

Plate 203.

Main South Coast Road. Penetration bituminous macadam on the Southport Deviation, which eliminates a very hilly section.

Plate 204.

Reinforced Concrete Bridge over the Warrego River, at Wyandra, which will be of great value to pastoralists.

Length, 300 feet; width, 18 feet.

PLATE 205.

PIONEER SHIRE. CUTTING ON KUNGURRI RANGE, ON THE MOUNT OSSA—KUNGURRI DEVELOPMENTAL ROAD, IN THE MACKAY DISTRICT.

This road serves sugar, fruit, and dairy farmers.

PLATE 206.

PART OF MARYVALE FLATS SECTION. FARNBOROUGH—BYFIELD ROAD, IN LIVINGSTONE SHIRE, ROCKHAMPTON DISTRICT.

This road serves a rising fruit-growing district, the products of which are in demand on the Melbourne and Sydney markets.

Plate 207.

Douglas Shire. Mossman—Daintree Road, North Queenland, looking down on Barratt's Creek.

The road will serve the most northerly dairying settlement in Australia (latitude 16 deg South), with an average annual rainfall of 80 inches. A coconut plantation is seen in the left foreground.

Plate 208.

Tinaroo Shire. Atherton—Boar Pocket Road, North Queensland, looking towards Atherton from bridge approaches.

This road and bridge serve a red volcanic dairying area in latitude 17 deg. South

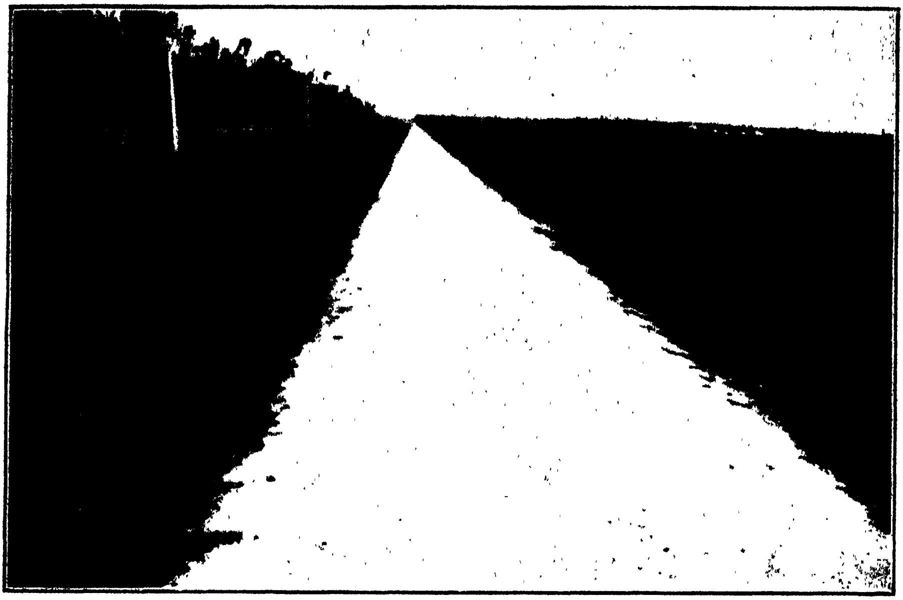

PLATE 209.

WAMBO SHIRE, DALBY DISTRICT. WARRA—INVERAI ROAD. BURNT SHALE PAVEMENT. Serving a good dairying district.

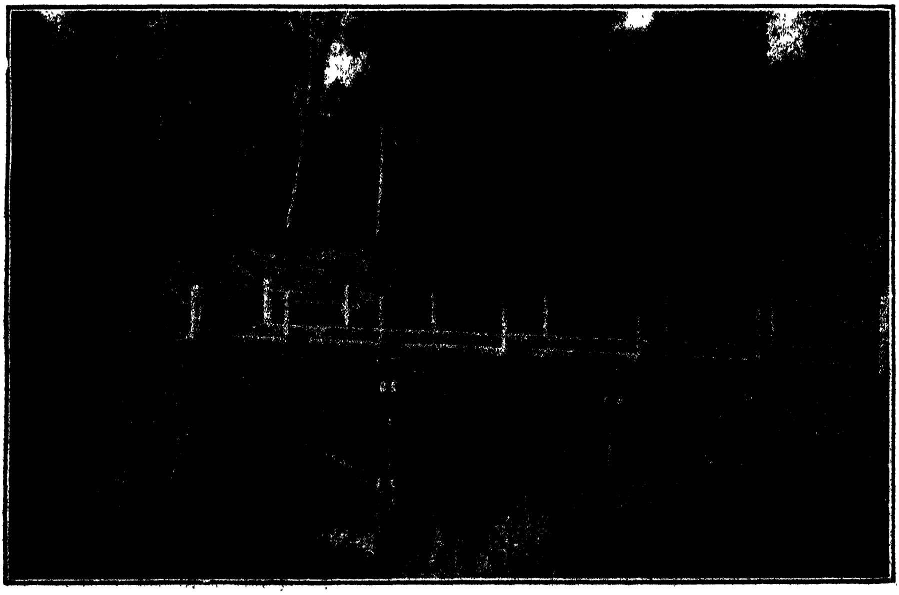

PLATE 210.

CERATODUS—NEW CANNINDAH ROAD, UPPER BURNETT. THREE MOON CREEK, SHOWING CONCRETE KERBING ON A TIMBER BRIDGE.

Plate 211.

Caves—Charcoal Scrub Road, Rockhampton District—serving agricultural and dairying settlements. Mount Etna (Limestone) in the distance.

Plate 212.

Livingstone Shire. Section of Caves—Charcoal Scrub Road before construction.

PLATE 213.
MAIN GYMPIE ROAD, PETRIE SECTION. GRAVEL TREATED WITH BITUMEN. FIRST BLADING.

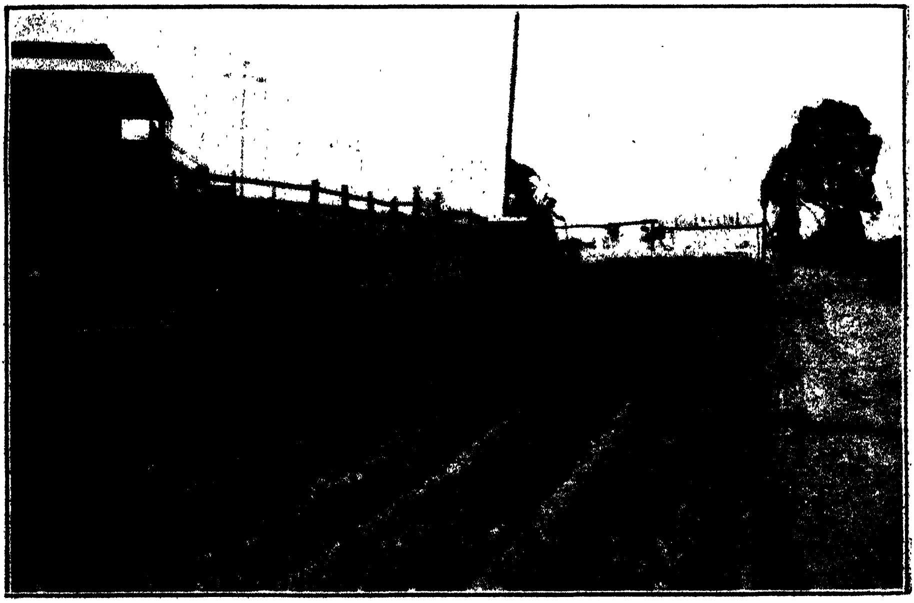

PLATE 214.
MAIN GYMPIE ROAD, PETRIE SECTION. GRAVEL TREATED WITH BITUMEN. SECOND BLADING.

PLATE 215.

PENETRATION BITUMINOUS MACADAM ROAD UNDER CONSTRUCTION AT GATTON ON BLACK SOIL ROAD. THE FLANKING IS LOCAL SANDSTONE, AND THE CENTRAL PORTION BASALT.

The top course had not been completed when the photograph was taken.

PLATE 216.

MAIN GYMPIE ROAD, NEAR BRISBANE. GRAVEL ROAD TREATED WITH BITUMEN.

This is the first experimental section completed in November, 1928. No maintenance to date.

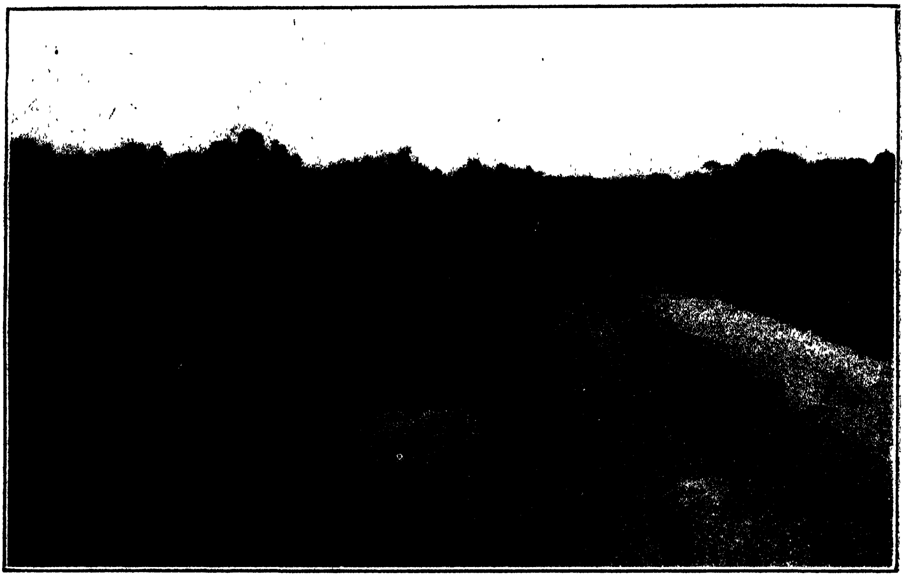

PLATE 217.

BULLOO SHIRE. QUILPIE—EROMANGA ROAD. METALLED ROADWAY OVER SWAMP COUNTRY.
This carries traffic from as far out as the South Australian border to the railhead at Quilpie

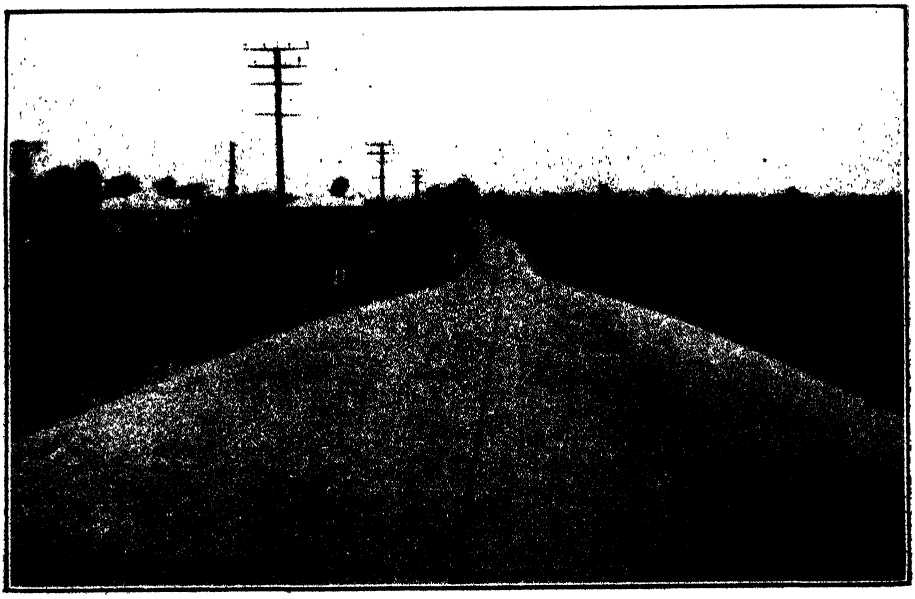

PLATE 218.

BRISBANE—TOOWOOMBA ROAD. 20-FEET CONCRETE SECTION AT MOOROOKA, NEAR BRISBANE.

Plate 219.

Thallon—St. George Road, in the Balonne Shire. Partly rolled indurated marl.

St. George is a thriving township of about 1,200 people, situated in a rich pastoral district distant about 50 miles from the South-Western Railway, and has a fine frontage to a beautiful reach of the Balonne River.

Plate 220.

Paroo River Bridge approaches, South-Western Area. This flood section is paved with penetration Trinidad asphalt.

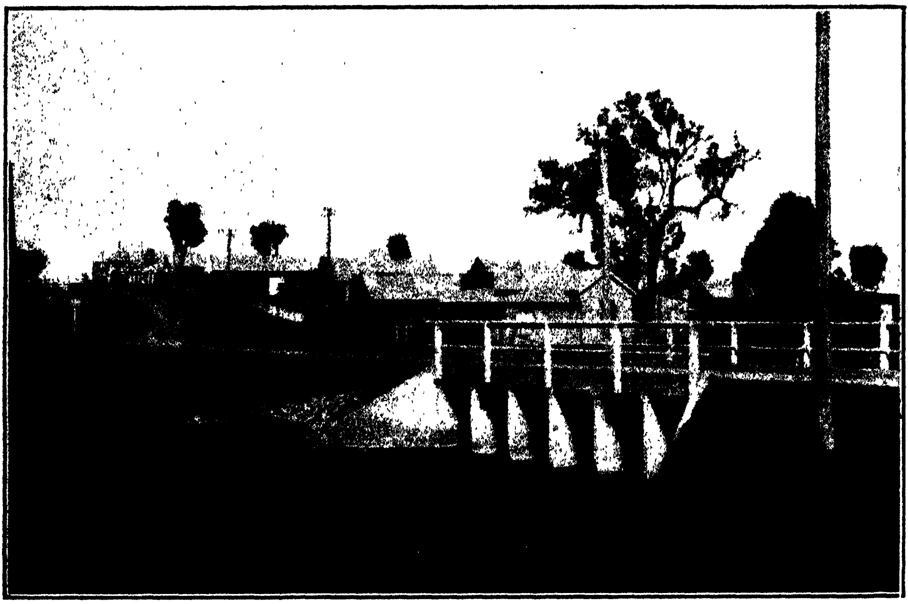

PLATE 221.

MURGON—GAYNDAH ROAD. LAMB STREET REINFORCED CONCRETE CULVERT IN MURGON TOWNSHIP.

PLATE 222.

KINGAROY SHIRE. BRIDGE OVER THE BOYNE RIVER ON KINGAROY—BURRANDOWAN ROAD.

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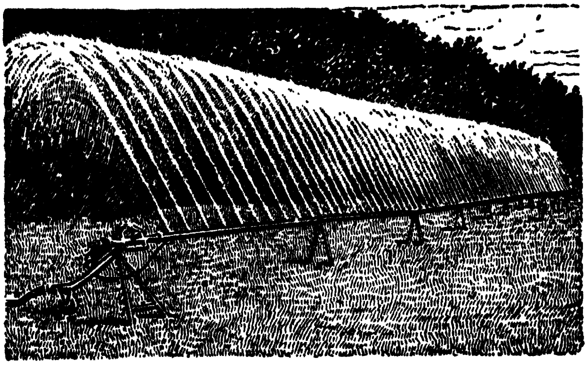

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Patent Oscillator which operates automatically, slowly turning spray lines from side to side, thus irrigating both sides and ***covering a space of 100 ft. by 60 ft.***

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TROPICAL FRUIT CULTURE IN NORTH QUEENSLAND.

By W. J. ROSS, Senior Instructor in Fruit Culture.

NORTH QUEENSLAND, though situated well within the tropics, with its altitudinal differences, possesses a great diversity of climate, varying from hot and moist on the coastal area to the bracing atmosphere of the higher tablelands west of the coastal range. The following notes refer, however, to the narrow strip of country east of the range, between Townsville and Cooktown. The climatic conditions existing within even this area, vary from comparatively arid districts—e.g., between Townsville and Rollingstone—to regions of very heavy rainfall. The most humid portion is that between Ingham and Port Douglas. North and south of these centres the normal precipitations decrease in volume. The rainfall, in regular seasons, concentrated within the early months of the year, varies in different parts from more than 150 inches to less than 50. Precipitations are heaviest under the Bellenden-Ker Range in the vicinity of the Russell River. Cool conditions persist from May to August, the remainder of the year being characterised by the usual tropical summer weather.

Suitable Soils.

A variety of soils suitable for many agricultural and horticultural purposes, including the cultivation of tropical and sub-tropical fruits, occur within the area. Included in this fertile region is a great tract of land not at present utilised, whilst the best of the remainder is devoted to sugar-growing. In view of the restrictions at present limiting the extension of this crop, economic considerations emphasise the need for the introduction of new, and the furtherance of existing agricultural pursuits in the North. That fruitgrowing on a reasonably extensive scale could assist in this direction is fairly well assured, hence the question: What fruits, other than pineapples and bananas, may be considered to offer commercial possibilities under existing conditions? This discussion therefore will be confined to those tropical fruits whose known characteristics merit serious attention.

Present Position of Tropical Fruit Cultivation in the North.

Although considerable quantities of bananas, pineapples, and citrus were exported from North to South in earlier times, the development of other varieties of fruit received but scant attention. Excepting the mango, the granadilla, the papaw, and some of the anonaceous fruits—all of which, for reasons discussed later, have not attained to commercial dimensions—little has been accomplished beyond the introduction of odd trees of other fruits. Experimental work has been of a somewhat indeterminate nature, and reliable data concerning the behaviour under Northern conditions of such trees as were introduced is rather scanty. Innumerable mango trees are found growing mostly in a semi-wild state throughout the North, and, generally speaking, the fruit of these is of an inferior quality, containing much fibre and having large seeds. These characteristics of existing North Queensland mangoes explains to some extent why they do not hold a better position commercially, for such qualities do not commend themselves to the Southern taste. Certain types, however, have little fibre and can be used for dessert equally with other fruits, both temperate and tropical. Instances of attention having been given to selection are few though not entirely absent, hence it is that few mangoes are exported to Southern markets. Where selection has been practised—at Bowen for instance, it has been demonstrated that fruit of good quality and suitable for long distance transport can be grown on a profitable basis. When grown in the North, fruits of both the papaw and the granadilla require to almost mature before picking, hence in the absence of adequate transport facilities the large scale culture of these fruits is at present a hazardous undertaking from an economic viewpoint. The passion fruit (*Passiflora edulis*) also has distinct possibilities. A few trees of the Litchi group introduced to the Mossman and Cairns districts have demonstrated that certain of these grow well and bear fruit under cultural conditions not altogether conducive to best results. The mangosteen has not been fairly tested in the area, but evidence derived from observations on the only bearing tree growing in the old nursery at Kamerunga, warrants attention to the culture of this fruit. As regards citrus, it has been decisively shown that excellent fruit can be successfully produced in several districts, particularly in the vicinity of Cooktown, where, with the aid of irrigation judiciously applied, trees may be made to crop at almost any period of the year.

Scope for Cultivation—Soils.

Since it has been mentioned that the soils of the tropical coastal area are of a diversified nature, varying from the richest alluvial and scrub soils to those of low fertility found more or less on undulating and flat country, it is considered appropriate for the purposes of these notes to divide them as follows:—

A.—The red and chocolate volcanic soils occurring extensively in what is known as the "wet area" from Ingham to Port Douglas, on more or less elevated country.

B.—The alluvial loams that also occur largely in the "wet area."

C.—The free sandy loams of various colours, either scrub or forest, in areas of lighter rainfall—viz., at Rollingstone and Cooktown.

Almost everywhere these soils possess good natural drainage, a considerable advantage to any projected development of fruit growing in the North. Soils exhibiting any tendency to water-logging or consequent souring during periods of heavy rainfall, had better be passed over in the selection of orchard sites. Deep rooting is a habit to be encouraged in relation to the growing of fruit trees, and unless soil conditions are, or can be made, favourable for its attainment, the location may not be considered as suitable.

Volcanic Soils.

Group A.—Of the three classes of soils, those in Group A are usually fairly deep, though in some cases covered to a greater or lesser extent with basaltic boulders. The surface soil is friable and the subsoil, as a rule, corresponding in colour with the surface, is usually easily penetrable by the roots of trees. Occasionally subsoils of a compact character are found and such hardly satisfy the standard of conditions generally considered favourable to the production of tree growth. Soils of basaltic origin are usually fertile and in their virgin state covered with dense tropical jungle characterised by a rank growth of lawyer vines amongst timbers, many of which are of high commercial value. These soils are especially adapted for the growth of an extensive range of tropical and sub-tropical fruits. Areas of forest soils or inferior scrub soils may be basaltic in origin, and though scarcely so rich as those bearing dense jungle, when well cultivated, permit the growth of similar fruits.

Alluvial Loams.

Group B.—These may occur in proximity to rivers and creeks, in extensive flats at bases of mountain ranges, or between them and the coast-line. They figure prominently in the constitution of the richest sugar districts such as Herbert River, Tully, Johnstone River, Babinda, Gordonvale, Cairns, and Mossman. These soils are exceedingly fertile, deep, well drained, and capable of growing any tropical or sub-tropical product tolerant of the prevailing climatic influences—i.e., abundant moisture and humidity.

Free Sandy Loams.

Group C.—The third series of soils mentioned varies in density from light sandy loams to medium loams. They are well drained and make good fruit soils when subjected to efficient cultivation. They are easy to work and retain moisture well when kept in good tilth. By the addition of green manures and the judicious application of irrigation, excellent results may be obtained from them, especially with citrus and other sub-tropical fruits.

SELECTED LIST OF FRUITS.

In considering the possibilities of fruits that may be grown commercially, three points have been kept in view, viz.:—

1. That suitable climatic and soil conditions meet the requirements of the plant.
2. That with existing transport facilities the fruit may be marketed without undue difficulty. (See note on Avocado.)
3. That edible qualities should command ready sale in all parts of the Commonwealth.

In compiling the following list as being worthy of consideration in relation to fruitgrowing projects in this area, due regard has been given to the opinions of investigators of these matters in other countries.

Avocado *(Persea gratissima* Guertin).

Tree growth variable according to species, but mostly vigorous. Fruit of many shapes, from oblate to bottle-shaped. Colour light green, dark green, purple, brown, and red. The centre occupied by single large seed. The rind may be thin and delicate to thick and leathery. Edible portion situate between rind and seed, and when properly ripened is of the consistency of firm butter; texture should be smoothe and free from fibre, but many seedling fruits are quite the reverse. Productivity is as variable as other characters mentioned among seedling trees.

Soils.—The tree is not exacting in its requirements so long as good drainage is afforded. Loamy soils rich in organic matter (humus) and capable of retaining moisture are preferable.

Varieties.—Trapp, Dickinson, Taft, Pollock, Meserve, Murrieta, Solano, Colorado, Lyon, Cardinal, Quality, El. Presidenti, and Puebla.

Propagation.—Budding desirable varieties on to seedling stocks resulting from seed taken from well grown fruits off healthy and vigorous trees.

Carrying Capabilities.—In some varieties keeping qualities are much better than in others. Thick-skinned varieties are, if of a slow-ripening character, best suited for distant markets. Refrigeration offers possibilities in regard to long-distance carriage.

Mango (*Mangifera indica* L.).

Growth strong among seedlings, but not so much so in worked trees. Fruit varies in size and character. Skin smooth, and in some highly coloured, the latter depending on climate in which they are grown. Flesh yellow to orange in colour, juicy and often fibrous in seedlings and inferior budded varieties, but in the best sorts entirely free from fibre; texture smooth and melting, rich and luscious in the best varieties.

Soils.—Sandy loams capable of retaining abundant moisture.

Varieties.—Alphonse group—"Bennett," "Amini," "Cambodiana," "Pairi." Mulgoba group—"Haden," "Mulgoba." Sandersha group—"Sandersha." Philippine type—"Carabao," "Pico." Bowen type—"Kensington Pride," "K.P.A." (H. B. Lott.).

Propagation.—Shield budding desirable varieties and top-working inferior kinds.

Carrying Capabilities.—Reasonably good when properly treated and packed.

Mangosteen *(Garcinia mangostana* L.).

Tree of medium size, slow grower, and slow to produce fruit. Fruit round, 2½ to 3 inches in diameter. Rind thick and tough; colour dark purple to almost black. Edible portion surrounding seeds in centre of fruit consists of a white substance of delicious flavour.

Soil.—The mangosteen prefers a rich, moist, and well-drained soil, and sheltered locations in districts of great humidity.

Propagation.—Offers a field for experiment in relation to budding, grafting, and air-layering to hasten fruiting.

Varieties.—Available stocks are Garcinia Xanthocymus, Garcinia Mestoni, and Garcinia Gibsi, the latter two being indigenous to the Bellenden-Ker and Booje areas, North Queensland.

Litchi *(Litchi chinensis* Sonnes *Nephelium litchi* Bailey).

A handsome tree of medium size. Fruit about the size of a small plum, produced in loose bunches; the translucent, pleasantly acid, juicy aril, enclosing seed, is contained in a red, warty, thin shell. Of good quality eaten out of hand or dried.

Soils.—Deep loamy soils rich in humus in areas of heavy rainfall and humidity.

Propagation.—Grafting, air-layering, and by seed. Budding should be tried. Stocks: Litchi and Loongan (Euphoria longana).

Carrying Capabilities.—Reasonably good with refrigeration. Fruit can be preserved or dried. Imported into the Commonwealth in latter form.

Varieties.—(Indian) "Bedana," "McLean's," "Rose" (Chinese), Lohmaichi.

Rambutan *(Nephelium lappaceum* **L.).**

Tree vigorous and erect. Fruit resembles the Litchi in character. Borne in clusters, shape oval, 2 inches long, covered with soft fleshy spines. Colour red, sometimes orange-yellow. The outer covering of fruit from which the spines arise is thin and leathery, and when removed exposes a white translucent juicy aril which adheres to an oblong-pointed flattened seed. The flavour is acidulous, suggesting that of the grape.

Soil.—Deep rich loams, well drained, in moist hot areas.

Varieties.—Malayan and Ceylon.

Propagation.—Similar to the Litchi.

Brazil Nut *(Bertholletia excelsa).*

Large growing tree. Fruit large, containing eighteen or more nuts.

Soil.—Rich deep loams and scrub soils in areas of abundant rainfall and great humidity. Imported into the Commonwealth.

THE STATE NURSERY, RUSSELL RIVER.

The institution of an Experimental Station on Russell River is an important step towards the development of tropical fruit culture. The economics of production in connection with land settlement warrants attention to research. In order that such research should have economic and practical value, a broad field of operations should be provided to admit of experimental work in relation to plant production, including propagation, acclimatisation, plant breeding, soil investigations, and protective work in relation to diseases and pests. That there is a field offering for investigation of stocks and scions is generally recognised, especially in the case of the mangosteen. The introduction of plants and the testing of them under North Queensland conditions presents an important aspect, as it would furnish tangible evidence on the possibilities of successfully producing many tropical products in this area. Plant-breeding is an inviting field for the production of new, resistant, and more productive varieties. It is obvious that a research and experimental station could assist very largely in the development of tropical fruit-growing, especially of those fruits discussed in these notes.

SUMMARY.

1. The areas suited for the growth of tropical fruits are outlined.

2. Suitable soils are classified and necessary modifications on cultural procedure with each fruit considered.

3. The fruits with potentialities are listed and include Mango (*Mangifera indica* L.), Avocado (*Persea gratissima* Guertin), Mangosteen (*Garcinia mangostana* L.), Litchi (*Litchi Chinensis* Sonnes), Rambutan (*Nephelium lappaceum* L.).

4. The functions of an experimental and research station at Russell River in relation to these fruits are discussed.

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SUBSIDIARY INDUSTRIES FOR WESTERN QUEENSLAND.

By WILLIAM LESLIE, Assistant Instructor in Fruit Culture.

The time seems opportune for the consideration of other means of utilising land in Western Queensland. The success attained by the Prickly-pear Commission is setting free large areas, some of which are already cleared of pear and on which ringbarking is proceeding, particularly between Warra and Miles.

Several kinds of economic plants deserve attention in this regard, including:—

Fruit.

The cultivation of citrus fruits might well be extended to this region, because the finest quality of oranges, mandarins, and lemons can be grown and are being grown. Grapes of the finest quality do very well, and with a largely increased production a dried fruits industry might be established. Olives are already growing well on a small scale in Western Queensland, and the date palm also thrives there. There is a risk, however, in some districts of fruit trees and vines being attacked by white ants.

Fodder Trees.

In this comparatively dry area it seems reasonable to look to fairly deep-rooted edible trees and shrubs as a stock food standby.

A tree which has claimed attention recently is the carob bean (*Ceratonia siliqua*). It has been observed thriving and fruiting in isolated places in the West,* and indications point to its fitness for withstanding a prolonged dry spell. It yields an abundance of sweet pods and it is for the sake of these that it is cultivated in the Mediterranean region, and large quantities are imported into the United Kingdom as a concentrated cattle food. The pods could probably be desiccated and the seeds extracted readily. It could probably be best grown in the form of groves or wide shelter belts. The latter could be formed on the boundaries of paddocks and securely fenced to prevent the trees being injured and the pods, as they fall, being eaten by stock. Deep sandy soil, preferably on a ridge, would probably be most suitable. Trees could be planted at about 15 feet apart in rows 30 feet apart with a view to cutting out alternate trees in the rows in later years as required. The only cultivation appearing necessary after clearing and planting would be to run a disc cultivator between the rows several times a year and so keep down weeds and maintain subsoil moisture. The seedlings do not transplant readily, but a system of sowing a few seeds at each peg, *in situ*, might prove successful. The first crops would consist of few pods, but as the trees grow older increasing quantities would be harvested.† They could be raked off the ground and put in bags or if desiccating machinery were available they could be carted off loose to the machine. The desiccated pods could probably be readily stored in bags or in large tanks like maize. Some special use might be found for the seeds.‡

If this tree could be cheaply and extensively grown in Western Queensland, it would probably prove of immense value to the grazing industry. Seeds of this tree have already been distributed on a small scale and several stockmen are interested.

Fibres.

Among fibre-yielding plants there are some which are reputed to be drought-resisting. The Sisal Hemp (*Agave rigida var sisalana*) is one, and from isolated instances it would prove hardy and prolific. A number of plantations could be grouped round a factory in a position where water would be available for retting the leaves and washing the fibre. It might also be possible to extract the fibre by a dry method. The freshly cut leaves might be dried in the sun before being sent to the factory.

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* Crystal Brook, via Bowenville, Mr. R. H. Fuller. Guluguba, Wandoan Line, Mr. P. F. Stiller. Palm Grove, Guluguba, Wandoan Line, Mr. E. W. Stiller.

† 800 to 900 pods per tree (Chamber's Encyclopedia).

‡ The bark and leaves of the Carob are used for tanning (Ibid.).

Several species of Bowstring Hemp (*Sanseviera*) might also be exploited. Some species have leaves of a succulent nature and are likely to be drought-resistant. With Queensland-grown fibre available, rope and sack-making might be considered as economic possibilities.

Rubber.

The only rubber-yielding tree which would be likely to adapt itself to the climate of Western Queensland is *Manihot Glaziovii*—the Ceara rubber tree. It is reputed to thrive in dry barren soil on the east of South America. It is tuberous-rooted to some extent, indicating the possibility of its being drought-resistant.

THE BANANA INDUSTRY.

PREVENTION OF THE SPREAD OF DISEASE.

The Minister of Agriculture, Mr. H. F. Walker, announced recently that a special committee of the Provisional Banana Industry Protection Board had been at work during the preceding week on the North Coast. Among matters that engaged attention was the investigation of the practicability of establishing a buffer area by the eradication of all bananas in a suitable strip of territory in the hope of preventing the spread of Bunchy Top northwards to disease-free districts. The committee traversed the area between Eumundi and Nambour, and reports that in the region between Eumundi and Yandina there are approximately 150 growers, and between Yandina and Nambour approximately seventy growers. The probable cost of compensation to banana-growers would be from £25,000 to £50,000 apart from the cost of eradication. The effect of eradication would be to create a buffer area of not more than 10 miles wide. According to scientists there is considerable doubt as to whether a buffer area of this width would be sufficient to achieve the objective with a reasonable guarantee of efficacy. Having regard to all the considerations the full board has endorsed the committee's finding to the effect that a buffer area in the locality in question must be regarded as impracticable.

The board has recommended, however, that intensified inspection be provided for in the northern part of the area of slight infection and the southern part of the area which is believed to be free from Bunchy Top. It also recommends that special inspectors be located in the Buderim and Hunchy area, in the district between Nambour and Yandina, and in the territory between Yandina and Eumundi. The latter two districts are believed to be free from Bunchy Top, and the first mentioned is one in which Bunchy Top is present. Active steps are being taken to clean up the area already affected. Certain properties in the hands of the Agricultural Bank have been thoroughly cleaned, and growers are being called upon to do their part in eradicating the diseased plants on their properties. With the advent of the summer rains the danger of the spread of the disease is greater than in winter, and it is desired to do everything possible to control the disease and prevent its further spread northwards. The idea underlying intensified inspection in the two special districts between Nambour and Eumundi is to enable the immediate detection of any spread of the disease into clean territory.

The Minister also stated that he had arranged for the immediate carrying into effect of the recommendations of the Provisional Board. He added that the board had found that the past practice of giving an order for the cleaning up of diseased plantations within ninety days from the date of the issue of the order by inspectors had been taken advantage of unfairly by growers who, in many instances, deferred action until the end of the period, and even then, in some cases, allowing the ninety-day term to expire without undertaking the eradication or cleaning-up work required. Henceforward eradication orders would be limited to a period of twenty-eight days with power to the board to grant an extension, provided there was reasonable evidence that during the initial period of twenty-eight days the grower had made a reasonable effort to do what was required.

Mr. Walker stated further that, as the banana industry is of very great value to the State, every possible endeavour should be made to protect it. He hoped that it would be possible for the board to secure the co-operation of growers without the necessity of taking legal proceedings for breaches of the regulations. Such proceedings, however, would have to be taken against owners of plantations whose properties constituted a menace to the industry as a whole.

RURAL LIFE IN OTHER LANDS.—VII.

By the EDITOR.*

JOURNEYINGS IN GERMANY.

IN our last talk we gave some consideration to the development of agriculture in Germany. We showed that this was largely due to improved methods of agriculture, more intense cultivation, and closer attention to the economics of agriculture. For purposes of convenient comparison we took the production figures of Great Britain and placed them side by side with the figures of German output. This comparison showed that the volume of production was in favour of the German farmer; but we were also careful to point out that the difference was accounted for by the fact that in Great Britain the lesser volume of production was due, primarily, to so much more arable land being allowed to go into and remain in grass than was the case in Germany, and not to any superiority in skill and methods employed by the German farmer. As a matter of fact, in this respect, in my opinion, the British farmer more than holds his own, and as a live stock breeder particularly, as everyone knows, he has no superior. The comparative lesser volume of output in Great Britain was secondarily due to causes, economic and otherwise, which it is not our purpose at the moment to discuss. It is proposed now to give some time to a consideration of one or two of the economic phases of German agriculture, particularly in relation to co-operative associations, in respect to which I was able to make some small inquiry during my short stay in Germany.

Co-operative Sale of Live Stock.

One thing that impressed an enquirer particularly was the extent to which the co-operative principle is applied by the German producer to the sale of live stock. A study of available literature† helped one to understand this.

While the beginnings of the modern co-operative movement may be traced to the middle of last century, the co-operative sale of live stock only dates from the eighteen-nineties. Co-operation in this form was forced on the German farmer as a consequence of serious difficulties encountered in live stock dealing and in meat distribution.

In the rural districts the butcher buys his fat stock direct from the farmer. Direct purchase is not, however, possible in the large towns and industrial centres, where the demand for meat is enormous. Live stock dealing had become essential, and the trade had come increasingly to employ agents, while the live stock was sold on the markets by commission salesmen. In the larger cities a new intermediary element was introduced, the wholesale butchers coming into the market as buyers and slaughtering to sell to the retail dealers according to their individual requirements and extent of custom. Thus, in order to reach the consumer from the producer, the meat passed through the hands of the agent, the dealer, the salesman, and the wholesale and retail butchers. Such a system naturally created difficulties, due largely to the fact that the producer lost whatever influence he might have on the sale of his own produce. In particular, the small farmer was completely at the mercy of the dealer, who was favoured especially by the circumstance that, if losses were to be avoided, the producer's stock which was ready for market had to be sold at once. The fact, too, that the market price was known by the dealer before the farmer knew it was a further cause of trouble; there were no means of finding out precisely the prices actually paid, and the market reports were not always quite reliable.

Although money-lending in connection with live stock dealing—a curse in the Rhine Provinces and also in Hesse—had been checked effectively by the action of the co-operative societies, the dependence of the small occupying owner on the dealer continued, though he was not fully aware of the fact. On the other hand, the interests of the consumer were also disregarded by the live stock dealer, who in this case also made full use of his power.

These difficulties have a ring of familiarity to the Queensland farmer; as a matter of fact, they are common to most countries. The price of many of the most important articles of food is often determined by chance, want of means, and a system that, in practice, is often quite unfair. A well-considered organisation of the live stock trade along enlightened lines has not been very evident anywhere.

Other difficulties were noticed in Germany which, on occasion, provided some striking examples of disorganisation in respect to the disposal of rural products. No co-operative activity has ever been spared the "ailments of babyhood"; it must go through its teething and measles periods. That was our experience in Queensland, and it was no less so in Germany. In the co-operative sale of live stock mistakes were made and heavy handicaps carried. The trade waged an extraordinarily keen fight against the co-operative societies, and used every available weapon. The co-operative movement constituted a challenge to the existing order, and the challenge was accepted immediately. Large sums were sacrificed by the dealers with the object of defeating the farmers' efforts to control their own industry. Unfortunately, bad faith among the co-operators, a condition of disloyalty with which we are quite familiar, proved a valuable auxiliary to the trade in its war on the co-operative sale of cattle. The societies had to embark upon a direct campaign in which the main argument was that co-operation is based on the proper discipline of the members, and the farmer cannot shake off this painful dependence on the middleman except by a cheerful acceptance of the obligations he owes towards his co-operative society and his fellow farmers. But, despite all the difficulties in the way, these societies eventually by efficient service won through to success.

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* In a Radio Address from 4QG.

† International Review of the Science and Practice of Agriculture.

Price Regulation.

The importance of the local societies for the sale of live stock was shown in their influence in regulating prices and the stand they took against trade manœuvring and manipulation. For example, to quote one instance, after the formation of such a society in one district in Germany from which all the fat stock were sent to Berlin, the prices paid to the farmers went up 25 to 30 per cent. in consequence of the competition set up with the dealers.

The object of the co-operative sale of live stock was first and foremost to check unfair trade and to eliminate the superfluous middleman. But there were also wider aims, among them being the desire to secure to farmers a proper influence in price movements which had hitherto been dominated wholly and solely by the trade.

These co-operative societies developed remarkably up to the outbreak of the Great War. The war and war economy schemes put an end to the unrestricted co-operative sale of live stock, and the societies were merged in the general war economy organisation.

After the war, in October, 1920, the industry was decontrolled. Checks to free productive activity were removed, but the scarcity of all goods and the depreciation of the currency, with all its consequences, made co-operative selling difficult.

Growth of the Co-operative Idea.

The co-operative idea generally has gained much ground in Germany, as shown by the large increase in the number of co-operative societies in recent years. The number of co-operative live stock societies, for instance, has risen from 228 before the war to well over 400.

In the time at my disposal it has only been possible to touch the fringe of this interesting subject, but a closer study of this phase of agricultural organisation in Germany would, I think, well compensate for the time devoted to it. To sum up, in respect to co-operative live stock selling, the German farmers found that their work demanded the employment of a staff with high professional and technical qualifications. As I have pointed out before in a similar discussion, brains had to be matched with brains. To fall below their standard of efficiency was simply to court defeat, and that the German farmer could not afford. It was also found that a staff with purely business experience only was not sufficient. The staff must be permeated with the co-operative idea, and must bring to bear co-operative influence as strongly as possible in order to maintain the movement in full vigour; otherwise co-operative selling would become a mere counterpart of the trade, and the co-operative societies themselves would lose their economic and social character which made them so valuable in the national interest.

The difficult economic conditions of the present day demand the displacement of all unnecessary middlemen. That was the feeling among the German farmers, from what I could gather. In that respect it seemed to me that their viewpoint was identical with our own. It need not involve unreasonable claims on the part of the co-operative movement, nor any failure to recognise the right of honest trade to exist. There is plenty of scope for the activities of both, and the monopoly of either is a thing, I think, to be avoided. As in all co-operative work, the object of co-operation cannot be fulfilled unless individual farmers understand the necessity of maintaining in their own interest, and by means of active personal support, the institutions set up by their own industrial organisations. In effect co-operation means simply good discipline and good order.

A Word for Queensland.

If time had permitted I should have liked to have said something about what one was able to learn of the workings of the co-operative banks established by agricultural co-operative societies in Germany, and also something of their remarkable system of instruction in farm household economy. As regards farm household economy, however, for evidences of efficient instruction we have no need to go beyond the borders of Queensland. Our own State-wide system of public instruction, departmentally and otherwise, which, by means of travelling domestic science and technical instruction cars and rural schools, take the technical college from the city to the farm, compares, in my opinion, very favourably with similar systems, the operations of which I was able to observe in a necessarily restricted way, in the older countries of Europe which it was my good fortune to visit.

Back Through Rhineland.

Continuing our journey along the Rhine we passed on to Mayence, through Rheingan, a rich and beautiful district which produces some of the most famous wines of the world; past the Niedervald, clothed with vineyards at the point where the celebrated river quits the Rheingan, on to Wiesbaden, the famous watering place, surrounded with productive orchards and vineyards and beautiful public gardens.

The extraordinary exploitation of natural mineral waters in Wiesbaden and in Germany generally set one thinking of the possibilities of our own artesian wells in this regard. Looking ahead one can easily imagine the great asset Queensland will have in its bore waters, apart altogether from their inestimable value for stock purposes. For the moment I am thinking of the wells at Dalby and Muckadilla which—and this is only a layman's opinion—warrant far wider advertisement than they have yet received.

It was interesting to pass Rolandseck again and revive the memories of its tragedy; to pass the rock of Lorelei; the castle of Stolzenfels with its many turrets and beautiful oriel windows; to come to Boppard, where the river curves again and the ranges recede, giving a view of fair fields, fertile wheatlands, and vine-clad slopes; to pass St. Goar and the wonderful mediæval castle of Rheinfels, where the river broadens out into a lake-like expanse; to pass Bacharach, the island on which an old fortress stands and where, in the bad old days, all the ships that went by were compelled to pay tribute; and arrive at Mayence or Mainz, at the junction of the Main and the Rhine, a great commercial and manufacturing city in the midst of gardens and vineyards. It was there, in the reign of Augustus, the old Roman Mussolini, that Drusus drove in his tent pegs.

The Black Forest.

Having come so far, an excursion to the Black Forest, the home of history and legend, both weird and beautiful, could not be missed. The Rhine forms its natural boundaries on the south and west, its eastern mountain ranges are bordered by the plains of the Neckar, while its northern limit is marked by Baden Baden.

One can get to the heart of the Black Forest from a town called Freudenstadt, a place with something like 15,000 people, and situated on one of the outer mountain ridges. From there the railway descends into one of the most beautiful valleys of the whole region. There is a country where life may be observed in all its rustic simplicity, a community disturbed very little by modern discoveries and inventions, a remnant of the ancient Swabian race, whose political importance is long lost. There one found a people holding to much the same customs as their fathers and grandfathers did back through the centuries. The dominant impression of this district, which covers an area of something like 2,000 square miles, is of the forest which crowns every hill and borders every valley. It has no large towns, no large estates, and therefore no splendid country houses that are such a delightful feature of rural England. But there is scarcely a valley or mountain that has not furnished a legend or a tale of romance and high adventure to German literature.

From high up on one of the crests the silvered surface of a mountain lake reflects the castle on its opposite bank, while beyond and below lies the Rhine Valley, dotted with villages and tiny homesteads, and away in the distance, beyond Appenweier, the cathedral tower of Strasbourg, veiled with smoke and haze. To the east an array of mountain peaks, divided by deep valleys, break the skyline, while a little to the right some of the peaks of the distant Alps are faintly seen, while the great ranges of the Black Forest extend in parallel ridges to the south.

A short journey south-west of a place called Baierstrom brought us to the head of the Murg River and to the famous high road celebrated during the wars of the French Revolution. This road, paved and graded to bear the heaviest artillery, and extending for miles along the crest of the highest mountain ridge, connects the Rhine Valley with the Neckar.

Apart from the Forest itself, one of the most striking features of this part of Southern Germany is the magnificent system of country roads.

The average home of the Black Forest farmer exhibits the utmost in domestic economy. Furniture and conveniences are reduced to the limit of necessity. The same roof which protects the family shelters the live stock, hay, grain, and farm implements. Neither youth nor age exempts the women and girls from man's labour on the farm. One could see young girls alongside their grandmothers swinging the scythe to rhythmic measure. But the beauty of their country is beyond description, especially as we saw it in those days of a glorious June, when we were to go from the devastated fields of Northern France to the green meadows and murmuring streams in those delightful forest-bordered valleys in Southern Germany, and also to mark the grim and painful contrast. And so we took leave of a delightful province in Germany and its industrious and kindly people.

Though in this series it has only been possible to skim the surface, one finds that though much may be learnt from even such a fleeting observation of rural conditions in Germany, a strong impression remains that in general and economic progress in which points of similarity exist, the Australian farmer can well hold his own.

ON THE AIR.

LIST OF AGRICULTURAL LECTURES.

Following is a list of lectures on rural subjects which will be broadcast by the Queensland Radio Service from Station 4QG, Brisbane, from 2nd December until 31st January, 1930:—

Monday, 2nd December, 7.45 p.m.—"The Battle of the Breeds," by Mr. E. J. Shelton.

Tuesday, 3rd December, 7.45 p.m.—"Poultry," by Mr. P. Rumball.

Wednesday, 4th December, 7.45 p.m.—From the Queensland Agricultural College.

Thursday, 5th December, 7.45 p.m.—"Our Rural Resources," No. 2, by Mr. J. F. F. Reid.

Wednesday, 11th December, 7.45 p.m.—From the Queensland Agricultural College.

Monday, 16th December, 7.45 p.m.—"Marketing Pigs," by Mr. E. J. Shelton.

Tuesday, 17th December, 7.45 p.m.—"Sheep and Wool," Department of Agriculture and Stock.

Wednesday, 18th December, 7.45 p.m.—From the Queensland Agricultural College.

Thursday, 19th December, 7.45 p.m.—"Our Rural Resources," No. 3, by Mr. J. F. F. Reid.

Monday, 23rd December, 7.45 p.m.—"Christmas Day on the Pig Farm," by Mr. E. J. Shelton.

Tuesday, 31st December, 7.45 p.m.—"A Talk on Poultry," by Mr. J. J. McLachlan (Assistant Instructor in Poultry Raising).

Thursday, 2nd January, 7.45 p.m.—"An Organised Rural Industry," No. 1, by Mr. J. F. F. Reid.

Wednesday, 8th January, 7.45 p.m.—From the Queensland Agricultural College.

Monday, 13th January, 7.45 p.m.—"Prospects for the Pig Industry in 1930," by Mr. E. J. Shelton.

Tuesday, 14th January, 7.45 p.m.—"An Organised Rural Industry, No. 2, by Mr. J. F. F. Reid.

Wednesday, 15th January, 7.45 p.m.—From the Queensland Agricultural College.

Thursday, 16th January, 7.45 p.m.—"A Talk on Poultry," by Mr. P. Rumball.

Wednesday, 22nd January, 7.45 p.m.—From the Queensland Agricultural College.

Monday, 27th January, 7.45 p.m.—"Autumn Crops for Pigs," by Mr. E. J. Shelton.

Tuesday, 28th January, 7.45 p.m.—"Sheep and Wool," Department of Agriculture and Stock.

Wednesday, 29th January, 7.45 p.m.—From the Queensland Agricultural College.

Thursday, 30th January, 7.45 p.m.—"An Organised Rural Industry," No. 3, by Mr. J. F. F. Reid.

CLIMATOLOGICAL TABLE—OCTOBER, 1929.

Supplied by the Commonwealth of Australia, Meteorological Bureau, Brisbane.

Districts and Stations.	Atmospheric Pressure. Mean at 9 a.m.	Shade Temperature. Means. Max.	Shade Temperature. Means. Min.	Shade Temperature. Extremes. Max.	Shade Temperature. Extremes. Date.	Shade Temperature. Extremes. Min.	Shade Temperature. Extremes. Date.	Rainfall. Total.	Rainfall. Wet Days.
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Points.	
Cooktown	29·98	85	75	89	28	72	6, 7, 10	Nil	..
Herberton	..	83	57	91	25	47	9	58	2
Rockhampton	30·02	86	65	96	28	54	1	207	7
Brisbane	30·05	79	60	88	27	53	23	258	10
Darling Downs.									
Dalby	30·02	84	54	95	28	43	23	137	7
Stanthorpe	..	73	48	85	8	38	23, 27	361	7
Toowoomba	..	75	53	87	28	43	23	326	6
Mid-interior.									
Georgetown	29·92	97	65	102	27	56	3	46	1
Longreach	29·94	95	64	104	24	48	11	Nil	..
Mitchell	30·00	86	54	97	18	43	23	75	3
Western.									
Burketown	29·93	94	69	102	21	62	16	Nil	..
Boulia	29·97	92	55	106	23	46	11	Nil	..
Thargomindah	29·99	85	61	101	17	52	10, 26	Nil	..

RAINFALL IN THE AGRICULTURAL DISTRICTS.

Table showing the Average Rainfall for the Month of October in the Agricultural Districts, together with Total Rainfall during 1929, and 1928, for Comparison.

Divisions and Stations.	Average Rainfall. Oct.	Average Rainfall. No. of Years' Records.	Total Rainfall. Oct., 1929.	Total Rainfall. Oct., 1928.
North Coast.	In.		In.	In.
Atherton	0·85	28	0·22	0·07
Cairns	1·80	47	0·15	0·05
Cardwell	1·92	57	0·21	0·13
Cooktown	1·01	53	0	0
Herberton	0·87	42	0·58	0·04
Ingham	1·51	37	0·07	0
Innisfail	2·83	48	0·30	0·08
Mossman	2·68	16	0·89	0·34
Townsville	1·23	58	0·12	0·62
Central Coast.				
Ayr	0·95	42	0	0
Bowen	1·04	58	0·93	0·04
Charters Towers	0·67	47	0·38	0·19
Mackay	1·75	58	0·08	0
Proserpine	1·81	26	0·56	2·09
St. Lawrence	1·79	58	0·13	3·21
South Coast.				
Biggenden	2·23	30	2·08	0·49
Bundaberg	1·98	46	2·39	0·45
Brisbane	2·56	78	2·38	1·30
Caboolture	2·47	42	2·59	1·44
Childers	2·40	34	5·72	0·27
Crohamhurst	3·28	36	5·09	1·53
Esk	2·45	42	4·05	1·79
Gayndah	2·34	58	3·77	0·44
Gympie	2·69	59	3·06	2·25
Kilkivan	2·60	50	4·48	3·14
Maryborough	2·64	57	4·06	0·48
South Coast—continued:	In.		In.	In.
Nambour	2·91	33	5·64	0·72
Nanango	2·28	47	2·63	1·26
Rockhampton	1·79	42	2·07	1·26
Woodford	2·43	42	2·97	0·78
Darling Downs.				
Dalby	2·02	59	1·37	1·07
Emu Vale	2·17	33	2·14	1·60
Jimbour	1·88	41	2·00	2·25
Miles	1·96	44	1·78	0·27
Stanthorpe	2·53	56	3·61	1·83
Toowoomba	2·55	57	3·26	1·85
Warwick	2·27	64	3·50	1·55
Maranoa.				
Roma	1·74	55	1·41	0
State Farms, &c.				
Bungeworgorai	1·39	15	0·77	0·25
Gatton College	2·01	30	2·73	1·39
Gindie	1·41	30	1·04	..
Hermitage	1·87	23	..	1·26
Kairi	0·96	15	0	0·28
Mackay Sugar Experiment Station	1·49	32	0·56	0
Warren	2·02	14	..	0·47

GEORGE G. BOND, Divisional Meteorologist

CORRECTION.

In our reprint from "Hansard" in our last issue of the second reading speech of the Minister of Agriculture and Stock, Hon. Harry F. Walker, on the Diseases in Plants Bill, certain errors, due to an original mistake in the transcript, appeared.

The pink boll worm was obviously confused with the boll weevil, from which Queensland cotton fields are fortunately free.

On page 520 of the November Journal, in the last sentence at the bottom of the page and continuing on page 521 and thereon for two more sentences the Minister is reported to have said:—

"When cotton was introduced here and the question of ratooning came up, it was a debatable question whether the boll weevil, commonly called the corn-ear worm, which attacks similar plants, backed up by many other weevils, was responsible for enormous loss, and in some parts of the world would not practically annihilate the industry here. Through the care of the farmers in Queensland we are now producing cotton almost free from the diseases which affect many other countries. When cotton was produced in the Lockyer district the boll-weevil almost wiped it out."

Those sentences should have read:—

"When cotton was introduced here, and the question of ratooning came up, it was a debatable question whether the pink boll worm and the pest commonly called the corn-ear worm, which attacks cotton and many crop plants, backed up by other insects, which have caused severe losses in other parts of the world, would not practically annihilate the cotton-growing industry here. Through the care of the farmers in Queensland we are now producing cotton free from many of the pests and diseases which exist in many other countries. When cotton was first produced in the Lockyer district the boll worm, or corn-ear worm, almost wiped the industry out."

Photo.: E. Gottke.]

PLATE 222.—MONSTERIA DELICIOSA; GROWN BY MR. BARLOW BLAIKE, YEPPOON.

WORMS IN SHEEP.

DRENCHING TESTS.

By J. CAREW, Instructor in Sheep and Wool.

In the course of the last few seasons losses of sheep, caused by stomach and intestinal worm infestation, have occurred in many districts in Queensland. Most of the losses sustained were among weaners, but sheep, both wethers and ewes, up to and including full mouths, were also lost in large numbers. Many growers complained that after giving the usual drenches to control stomach worms, the sheep did not show any improvement, consequently they blamed the drenches used and tried new ones. In most obstinate cases investigated it was found that besides the ordinary stomach worms (*Strongylus contortus*) found in the fourth stomach there were also several bent-head round worms in the large intestines. These are very difficult to dislodge owing to the strength of any drench being diminished or absorbed in its passage through the stomachs and small intestines before reaching these worms, which occupy the cæcum close to the colon.

Drenching under the most favourable circumstances necessitates a considerable amount of extra work and expense as well as being hard on the sheep. If they are wormy and given a good drench they improve quickly, but if given a drench that will not kill even the worms in the fourth stomach much work and expense is incurred without any benefit.

Tests at Milmerran.

In order to test some of the recognised drenches in use, and check up on other recent introductions for which satisfactory results were claimed, forty-eight sheep were selected from the wether flock on a property near Milmerran, which were yarded on the evening of 7th October last.

On 8th October they were formed into six groups, each group being branded with a distinguishing mark and dosed between 12 and 2 p.m. The mixing of ingredients, the preparation of drenches, the dosing of each group, and the post-mortem examination was carried out in the presence and with the assistance of Messrs. Euston King, S. Goodsen, and P. J. Bailey.

Group No. 1 was drenched with a 2 fluid ounce dose of a formula containing 2 oz. avoir. arsenic and 5½ lb. Epsom salts to 5 gallons of water. One sheep from this group was killed twenty-four hours after drenching, which on examination showed several stomach worms (*Strongylus contortus*) alive and a few dead in the abomasum or fourth stomach. Several bent-head round worms were found alive in the large intestines. Most of these were located, as is usual, in the cæcum close to the colon.

Forty-eight hours after drenching another sheep from this group was killed. No stomach worms dead or alive could be found in the fourth stomach, but numerous bent-head round worms were found alive in the large intestines. During the test these sheep showed no difference in appearance to the control sheep on the first day, but were better and brighter on the seond day.

Group No. 2 was drenched with a 4-oz. dose of a formula containing 1 lb. bluestone, and 1 lb. mustard to 10 gallons of water. One sheep from this group was killed twenty-four hours after drenching which showed a few stomach worms alive and several dead in the fourth stomach. Several bent-head round worms were found alive in the large intestines. The coating of the fourth stomach was somewhat inflamed, but the group was normal as compared with the control lot.

Forty-eight hours after drenching another sheep from this group was killed. Examination revealed no worms dead or alive in the fourth stomach, which showed no signs of inflammation. Some bent-head round worms were found alive in the large intestines.

Group No. 3 was drenched with a 2-oz. dose of a formula containing 2 oz. arsenic, 5½ lb. Epsom salts, and 8 oz. bluestone to 5 gallons water. The sheep which was killed from this group twenty-four hours after drenching showed no worms in the fourth stomach either dead or alive, but a few stomach worms were found dead in the bowels. Bent-head round forms were found both alive and dead in the large intestines. The lining of the fourth stomach was found to be inflamed. This group appeared to be more tucked up and weakened as compared with other groups and controls.

Forty-eight hours after drenching, another sheep from this group was killed which showed no stomach worms dead or alive in the fourth stomach. There was no sign of inflammation on the lining of this stomach, which appeared quite normal. A few bent-head round worms were found alive in the large intestines. This group was much improved and quite equal in condition to any of the other groups.

Group No. 4 was dosed with 5 cubic centimetres of a formula composed of two parts carbon tetrachloride to three parts of paraffin oil. One sheep from this group killed twenty-four hours after dosing showed large numbers of stomach worms alive in the fourth stomach, but no dead worms could be found. Another sheep from this group was killed forty-eight hours after dosing, when only a few worms were found alive in the fourth stomach. Several bent-head round worms were found alive in the large intestines. The dose was given with a syringe fitted with a long nozzle which was inserted behind the tongue before being ejected, the mouth of the sheep being held open by an assistant. Immediately following the administration of the dose the sheep generally coughed in distress, but no evil effects followed and all the sheep in the group compared at par with other groups. A double dose was given to one sheep without causing any noticeable difference during the test, but was not killed to ascertain results.

Group No. 5 was dosed with 5 cubic centimetres through a syringe fitted with a long nozzle. The formula was prepared by Mr. Brünnich, Agricultural Chemist. One sheep from this group killed twenty-four hours after dosing was found to contain large numbers of dead stomach worms in the fourth stomach and a few alive. Some bent-head round worms were found alive in the large intestines, but appeared very "dopey." Forty-eight hours after drenching another sheep from this group was killed, when a few stomach worms were found alive and a few dead in the fourth stomach. A few bent-head round worms were found alive in the large intestines. The space where these worms are usually found was free, which would indicate that they had been passed out, although no dead worms could be found.

A double dose of this mixture was given to one sheep of this group. Twenty-four hours after dosing this sheep looked distressed and distended, forty-eight hours after dosing he was on a par with the remainder of the sheep in this or any of the other groups.

Group No. 6 was branded but received no treatment. This group was kept with the sheep which were treated in order to check up on them during the test. These sheep showed about the same as the best of the treated groups twenty-four hours after the other groups had been dosed, but did not brighten up to the same extent during the following day. Forty-eight hours after the other groups were dosed two sheep from this group were picked out to be slaughtered. The first one killed was in good condition, one of the best in the flock and suitable for mutton. On examination several stomach worms were found alive in the fourth stomach. The intestines did not show many nodules or lumps, while the bent-head round worms in the intestines were very few as compared with all other sheep examined. The second sheep killed from this group was in poor condition and similar to those killed from the treated groups. In the fourth stomach large numbers of stomach worms were found, the contents showing a seething mass. Nodules on the intestines were very numerous, while in the large intestines the bent-head round worms were very numerous.

In all the sheep killed a fair quantity of sand was found which may have been taken in while eating short grass from sandy ground, but usually the wormy sheep will lick up earth of some description and, incidentally, the control sheep that showed the greatest number of worms contained the greatest quantity of sand.

Twenty-four hours after drenching the weather turned very cold, and when the sheep were turned out they looked hollow and miserable. Early in the night it commenced to rain, yielding 35 points. It would have caused no surprise if a few of the weaker sheep, and especially those that received a double dose, had died during the night, but their quick recovery and bright appearance was very noticeable when brought to the yard at midday.

Summary.

As a result of the tests the arsenic and Epsom salts had killed only a few stomach worms at the end of twenty-four hours, but no living worms could be found at the end of forty-eight hours after drenching. The worms in the intestines were not affected.

The bluestone and mustard had killed nearly all the stomach worms at the end of twenty-four hours, and no worms could be found alive in the fourth stomach after forty-eight hours. The effect on the intestinal worms was not distinct or decided.

The arsenic, Epsom salts, and bluestone formula acted quicker than either of the above. Besides killing all the stomach worms within twenty-four hours it also killed many of the bent-head round worms in the intestines. By the appearance of the lining of the fourth stomach the dose is rather strong.

The carbon tetrachloride seemed to be quick in its action on the sheep when administered, but slower than either of those drenches containing bluestone in killing the stomach worms. No effect was apparent on the intestinal worms.

Mr. Brünnich's mixture showed the greatest number of dead worms in the fourth stomach twenty-four hours after dosing, although a few were still alive forty-eight hours after dosing.

Bent-head round worms were very "dopey" twenty-four hours after dosing, but as the dead worms were very difficult to find under the conditions prevailing, a definite kill could not be determined.

It will be noticed that the ingredients in Mr. Brünnich's mixture is not set out. As this is the first occasion on which it has been used by this department the test was only a trial which will act as a guide for further experiments.

Owing to the difficulty to correctly determine the result of the two drenches which acted on the intestinal worms, arrangements were made to carry out further tests in order to secure more definite results.

DRENCHING TESTS AT YEERONGPILLY.

Later tests were carried out at the Yeerongpilly Stock Experimental Station and following are the results:—

Eleven sheep were secured from the same flock at Milmerran. The sheep were drenched on 26th October and taken off good grass just prior to drenching. They had no water for sixteen hours.

Sheep No. 1.—Formula: 30 grams dichloro benzol, 100 cc. paraffin. Dose 5 cc., with a long-nozzled syringe. Post mortem forty-eight hours later revealed several stomach forms alive in the fourth stomach and bent-head round worms in the large intestine.

Sheep No. 2.—Drenched 26th October. Formula same as above. Dose, 10 cc. Post mortem seventy-two hours later. Several stomach worms alive in the fourth stomach, also bent-head round worms in the large intestines.

Sheep No. 3.—Formula: 30 grms dichloro benzol, 20 cc. benzol, 20 cc. petrol, 40 cc. castor oil. Dose, 5 cc. Post mortem seventy-two hours after dosing revealed both stomach and bent-head round forms alive in large numbers.

Sheep No. 4.—Formula: 20 grms dichloro benzol, 30 cc. benzol, 20 cc. croton oil, 60 cc. paraffin. Dose, 10 cc. Post mortem seventy-two hours after dosing. A few stomach forms were found alive in the fourth stomach, also a few bent-head round worms in the cæcum. The contents of the fourth stomach was below the usual quantity and soft, while the contents of the small and large intestines were also soft and contained much mucus.

Sheep No. 5.—Formula: 2 oz. (avoir.) arsenic, 6 lb. Epsom salts, 5 oz. bluestone, 5 gallons water. Dose, 2 fluid ounces. Post mortem seventy-two hours later. A few stomach worms were found alive in the fourth stomach. Bent-head round worms were found in the cæcum, but not in large numbers. Those which were present were not close to the colon as is usual, which would indicate that the drench had dislodged at least some of them. On this occasion the sheep were on good grass, which was green and carried a heavy dew during the early hours on the day they were drenched.

To secure the most reliable results a further batch of three sheep were selected and placed in a loose box at 4 p.m. on the 31st October. They were without food or water from then until 11 a.m. on the 1st November, when they were drenched with the following:—

Sheep No. 8.—Formula: 30 grms dichloro benzol, 100 cc. paraffin. Dose, 10 cc. Post mortem revealed plenty worms alive in fourth stomach. Worms of two varieties, specimens of which have been taken. Sheep killed seventy-two hours after drenching.

Sheep No. 9.—Formula: 20 grms dichloro benzol, 30 cc. benzol, 20 cc. croton oil, 60 cc. paraffin. Dose, 10 cc. No worms anywhere, dead or alive. Experiment chiefly remarkable for very inflamed membrane of fourth stomach and big gut. Consider that, recollecting seventy-two hours had elapsed since drenching, inflammation excessive and possibly dangerous.

Sheep No. 10.—Formula: 2 oz. arsenic, 6 lb. Epsom salts, 5 oz. bluestone, 5 gallons water. Dose, 2 fluid ounces. Many dead worms of two varieties in fourth stomach. No live worms. No live worms in either the fourth stomach or in the large intestines. No indications of inflammation. A fact to note in connection with this sheep was the extremely black blood when killing. This is not associated with the drench, but merely the fact is noted.

The cost of the different drenches is a matter of much importance as also is the time of preparation and the convenience of administration.

The cost of the ingredients to make sufficient arsenic and Epsom salts drench to dose 1,000 adult sheep would be approximately 4s.

This mixture must be boiled until the arsenic is dissolved, which generally takes about three-quarters of an hour. To add 5 oz. of bluestone to this drench would increase the cost to 4s. 6d. per 1,000 adult sheep.

Two and a-half pounds each of bluestone and mustard are required to drench 1,000 adult sheep at a cost of about 9s.

Carbon tetrachloride, two parts, and paraffin oil three parts, mixed together and given in a five cubic centimetres dose works out according to the price of the materials used at 20s. per 1,000 adult sheep.

The mixture which was used, as prepared by Mr. Brünnich worked out at a low cost, but as he is still working on it, for the purpose of further tests, the final results will be decided when these tests are completed.

Summary of the Yeerongpilly Test.

When the sheep were allowed on good grass up to the time of drenching the results were not so satisfactory as when starved from eighteen to nineteen hours at Milmerran, and in the case of sheep No. 10 at Yeerongpilly.

The quantity of bluestone in the arsenic and Epsom salts was reduced from 8 to 5 oz., at which strength it proved more satisfactory against both stomach and bent-head round worms than any other drench tried.

CATTLE BREEDING AND MANAGEMENT.

By H. ANNING, Wetherby, via Richmond, Queensland.*

When the cattle which have just been banged, drafted, and delivered have been turned out and started well away, ‘‘Algy’s’’ job is to hand the bullocks over to the drover, after first of all taking the ages and jotting them down. The drover takes them out to his camp, and starts herding them. It is handy to know the ages of the bullocks which are being sent away. These can be given to the agents to hand on to probable buyers, who will know just what they are going to inspect.

The drover who knows his work will hang up a lighted lamp on a tree in the yard. Bullocks get used to this, and look for it on the road, as it means a camp for them, and they will walk straight for it at night, round up and lie down. It seems to have a steadying effect on them as well. The object of having the bullocks well away from the branding yard is because the grass all round for a mile or so will be trampled down during the delivery, and it is essential that bullocks get a decent feed and drink every day, as then by the time they are ready to go on the road they will have been thoroughly broken in, and no trouble to handle. A good drover loves the job of herding bullocks, and ‘‘Algy’’ will find the extra expense of holding them preparatory to starting may be reflected later in the price he gets.

While in hand they will be fed down to the camp on the main creek, or probably there may be two camps, and these can be utilised week about. Of course, they will not be driven over the same bit of country each day. By the time they get back at night, they will be content to go straight in, find their night's camp and lie down, after a heavy sigh, and not stir again till daylight. Every day they get a bit quieter, and will let the drover ride through them without taking any notice. Of course, the fresh bullocks coming in every day stir them up a bit, but these soon settle down.

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* In the ‘‘Pastoral Review’’ for September. (Previous notes by the same writer were reprinted from the ‘‘Review’’ in the July issue of the ‘‘Queensland Agricultural Journal.’’)

When 1,000 are in hand it is time to start them south. In case of pleuro showing, it is essential to inoculate, which, properly done, speedily knocks the disease out of them. No doubt the bullocks will be headed for the nearest market, offered for inspection and sale on the road, and if not sold it is a good plan to offer by auction at a good centre after classing them. Failing that, it is well to get a bit of good agistment, let them freshen up and sell when rain creates a better demand. Exactly the same procedure is followed with the second lot.

It is always a relief to get a mob well away with a good drover. So many things can happen, and if they start rushing for any reason that makes things bad. Rushing (which American cattlemen call stampeding) is one of the worst and most nerve wracking businesses imaginable. It can start in a dozen different ways, but usually it commences with the bullocks getting a sudden start. They all jump up, panic-stricken, and start galloping. It generally ends (the first time) with "ringing," the cattle galloping around and around in one place till the ground is all cut up like a ploughed field. In some herds cattle can be counted on to rush for certain. Where they are run about and speared by blacks they are generally bad. Blacks run them into bogs, up blind gorges, and over rough country. What cattle escape never forget the experience, and the slightest thing starts them at night.

Since the bullocks keep rushing every time a mob is mustered, often a wing gets away, and these are mustered the following year, and being roguish start the next mob going, and so it continues from year to year. The longer cattle in hand rush the more terrified they get of one another. Many are killed, others are lamed, their horns knocked off, and it is most difficult to know what to do. If they start on the run the best thing is to box them up with a lot of mixed cattle, watch them in a good open place, and build a lot of fires around them. Mixed cattle won't rush like bullocks, and they act as a brake on operations. If they rush much at night, they want a long spell in the day. On watch, the men want good night horses and whips. Every time the bullocks rush off camp they should be flogged back to it. After a while they get to understand they musn't leave the camp.

On watch the more noise the men make the better. Bush classics like "The Wild Colonial Boy," "On the Banks of the Reedy Lagoon," and "The Branding of the Bunyip" may be sung to popular accompaniments. It helps to steady the cattle, keeps the men awake, and helps to educate newchums. Getting off to replenish fires (which should be kept burning freely) men must be warned not to get between the fire and the cattle, as the gigantic shadow suddenly thrown over the sleeping mob may cause a bad rush. One has to be careful when striking matches, especially on a dark night, and it is best to use a firestick. Plenty of light, good music, and good feed and water by night, and the cattle may settle down.

I remember one enterprising youth who had joined up with a rushing mob, saying to his boss who was taking a pack-horse into town for some sundries, when asked if he wanted anything, replied:"I'll get you to get me an accordeon to play on me watch—that'll quieten 'm down a bit." "Oh, I'll get you a peanner," responded the boss, and the youth understood and kept quiet himself in future.

Cattle are most dangerous when all are lying down (or nearly all). There are generally two or three standing, and when these lie down others get up. Cattle accustomed to rushing ofter give utterance to one or more "shivers" before jumping up. It can hardly be described, and must be heard to be appreciated. It is something like an electric thrill, which runs through the whole mob. It also runs through horse and man on watch. Old night horses know it, and prick up their ears at the deadly ominous murmur (although it can hardly be called a murmur), and one can feel their hearts thumping the saddle flap. They are all keyed up for an instantaneous start and a midnight gallop. Sometimes, after a few shivers, the cattle settle down and camp. Some drovers ride in amongst them, and stir them up, as cattle are not so likely to rush when moving about.

Few things make a man realise his pathetic futility more than a big rush on a dark night in timbered country. Everything may be peaceful, when a stick cracks, or the sudden flare of a match starts them going. In a split second they are off. The trained night horse races immediately for the leaders. He loves the game, even if the rider does not. The peaceful scene of a second before is changed to one of wild uproar, with men shouting and yelling, whips cracking, horses galloping, and high over everything the roar of the rush, as a thousand panic-stricken, maddened bullocks take a beeline through the timber, smashing undergrowth, tearing up trees, and crippling, maiming, and killing one another.

One advantage has the man on watch, and only one. His horse can gallop faster than the cattle, and he will, if the rider lets his head go. He can't see anything, but the horse will take him to the lead, and swing round with the leaders as soon as they are turned. Once on to the leaders the man must use his whip and try and swing them around. Once turned, they must be kept going back, as fast as they have left, if possible. It sounds easy enough on paper, but it must be remembered that the bullocks, under the influence of panic, will go anywhere, and the horse will surely follow, through scrub, over holes and antbeds, gullies or creeks—where a fall means sudden death—as the cattle will keep galloping straight ahead. If the men on watch are able to swing the mob around quickly (and time is surely the essence of the contract here), and flog the cattle straight back to camp, and do this each time, it seems to cow the bullocks, and in a while, after a few shivers, they will merely jump up and surge around the camp.

It is no harm, even then, to let the whips speak, and the bullocks will feel and know they can't get away, and it seems to give them more confidence in the watchers and in themselves. Rushing is simply fear of something unknown, and it speedily develops into fear of one beast for another. Old bullocks are hard to check, but young ones are not so bad. It is a bad business with either, though.

CAUSE OF LOW PRICES.

The prime cause of low wool prices is the high cost of the finished article, says the "Sydney Mail." There can be no doubt about that. If woollen clothing could be purchased cheaply enough it would sell without the slightest difficulty—and it is not the growers who are making the big profits out of it. Where are they going? Apparently there is an unreasonable rake-off between the manufacturer and the user. If that could be appreciably reduced there would be little need for a "use more wool" campaign. The same argument applies in the case of meat. For years now stockowners have been pointing out that the retail price of both beef and mutton is out of all proportion to the prices they are paid for their fat stock. Prices in the wholesale market conform with reasonable closeness to stock values, but after that there is a big difference.

With prices down for wool, and the mutton export markets disorganised, this disparity becomes of greater moment to producers. Obviously the bigger the disparity the more difficult it is for producers to get reasonable prices. A rise of 2d. or 3d. a pound in the wool market should not make any substantial difference to the ultimate consumer, but with our present costs of distribution it apparently does. The stating of the problem is easy, but the solving of it is difficult.

SOME CORRIEDALE HISTORY.

The origin of the Corriedale breed of sheep is usually credited to New Zealand, says the "Australasian" (Melbourne), but perhaps the first colonist to conceive the idea of establishing a fixed crossbred type of Lincoln-Merino was a South Australian pioneer. In the year 1872 Dr. Browne had some correspondence with the wool supply committee of the Bradford Chamber of Commerce in reference to his sheepbreeding operations at Moorak. Dr. Browne claimed to be the first in Australia to use the pure Lincoln with a Merino ewe, and one letter went on to say—"I sent them out in 1858, and even that is not sufficient time to produce a regular flock of any considerable number. But that it is possible all my efforts assure me, and I fully believe that I shall continue to grow long wools finer and with more lustre than any I have had the honour of submitting to your inspection. I have a stud flock sufficiently large to breed from by crossing one with the other, and the result of such breeding is to increase the lustre and not diminish the length of the fleece or the size of the sheep. . . . I use the longest fleeced and largest Merino ewes to put with the old, glossly-fleeced Lincoln ram. Hundreds of Merino ewes from this flock when dressed by the butcher weigh 80 lb. and more. The small Merino ewe has great difficulty in bearing to the pure Lincoln ram. The lamb is too large. So that if a breeder cannot get large Merino ewes he should begin with a Lincoln and Merino cressbred ram, and put the Lincoln ram with the increase. The Merino ewe possesses extreme fineness of fibre compared to the Leicester, and another valuable quality—closeness. This my Moorak sheep have in a great degree beyond the English Leicester, consequently you are correct in advising me to continue the use of the pure old lustrous Lincoln ram."

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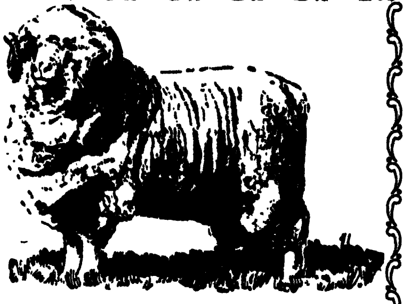

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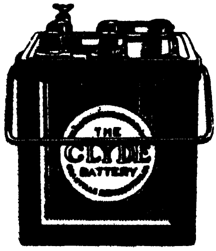

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MALNUTRITION.*

By J. C. BRÜNNICH, Agricultural Chemist.

A GREAT majority of our pastoralists had during the last few years a very serious setback on account of drought conditions, and therefore it became necessary to give some advice as to how such conditions may be mitigated, by drawing attention to mistakes made by many and beneficial results obtained by others through the use of licks, &c., during the past season.

The great aim of all animal husbandry is increased production, and this again depends almost entirely on the feeding of stock. Any errors in the feeding will cause malnutrition and disease.

Food Constituents.

Every one is familiar with the chief constituents of foods, which are—

(1) Proteins, nitrogenous compounds, the important flesh-forming nutrients;

(2) Carbohydrates (as sugar, starch, &c.) and fats, all nitrogen-free compounds which build up fatty matter and produce heat and energy;

(3) Mineral matters, which enter into the formation of bones, teeth, blood, and other fluids of the body; and finally

(4) "Vitamines," accessory foodstuffs of which very minute quantities are required for a complete maintenance of health and normal development of the animals, and generally well supplied in green pasture.

The requirement of mineral matter or salts received but very scanty attention until recent times.

The fact that all foodstuffs contain certain amounts of mineral matter, left in the form of ash when fodders are burned, was well known, and it was generally accepted that any animal fed in a natural way on common ordinary rations like grass, hay, and grain, would receive a sufficient amount of the mineral constituents with the food, which supplied the necessary amounts of proteins, fat, and carbohydrates for its maintenance and growth.

In all living matter the following inorganic constituents are found:—The non-metallic elements—Phosphorus, sulphur, siticon, chlorine, iodine, and fluorine. The metallic elements—Potassium, sodium, calcium, magnesium, iron, manganese, and aluminium; and probably traces of several other elements.

It is a false idea to think that the minerals are required for bone formation only. The inorganic constituents are as essential to animal life as the ordinary organic food constituents, proteins, fat, and carbohydrates. The most important function of the food minerals are performed in the soft tissue and in the blood, where they are essential constituents of living matter, and therefore they stimulate and control directly or indirectly all vital processes.

Functions of Mineral Constituents.

The chief functions of the mineral constituents performed in the animal body are the following:—

1. They are necessary for the maintenance of a proper physiological balance between the mineral elements in the body fluids. Any excess or deficiency of any one of the mineral constituents will affect the vital processes. A deficiency of potassium in the blood will act on the heart muscle and prevent it from relaxing properly, while an excess makes it relax so much that it stops beating. Common salt is an absolute necessity for nutrition, but given in excess will act as a poison and cause serious troubles. The mineral constituents maintain the practically neutral reaction of the blood.

2. They are necessary for the process of digestion. The digestive processes are affected by acidity and alkalinity of the digesting fluids. In the stomach an acid reaction must exist to aid in the pepsin digestion, whereas in the small intestine an alkaline reaction is necessary to allow the trypsin to act. The absorption of the digested products again is controlled by the concentration of the salts, and this concentration will also affect the passage of digested and undigested material along the intestines.

3. Mineral constituents are required as constructive material for the formation of new tissue and building up of the bone skeleton.

4. Milking animals require larger supplies of mineral matters to keep up the yield and average composition of the milk secreted.

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*A summary of lectures delivered to the pastoralists in different centres along the Great Northern and Central Railway Lines.

Considerations of Modern Research.

Modern research dealing with the mineral nutrition of farm animals has to consider—

1. Mineral requirement of the various species of farm animals.
2. The correct balance or proportion between the different constituents.
3. Relationship between the inorganic and organic portions of the ration.
4. Effect of outside factors, like sunlight and exercise on the mineral metabolism.
5. Study of diseases caused by faulty mineral nutrition.
6. Mineral constituents of various food stuffs.

1. Of the mineral elements required in the largest amounts for growth, &c., calcium or lime and phosphorus or phosphoric acid stands out on their own, and this is very clearly indicated by the large amounts of both found in the milk of the lactating animals. It will be noticed that the faster the growth of the young animal, the greater the amount of mineral matter required and supplied by its mother's milk.

Species.	Time Required to Double Weight.	COMPOSITION OF MILK.					
		Protein.	Fat.	Sugar.	CaO.	P_2O_5.	Ash.
	Days.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Woman ..	180	1·6	3·3	6·2	0·049	0·056	0·25
Horse	60	1·8	1·2	6·9	0·120	0·130	0·30
Cow	47	3·5	3·8	4·8	0·161	0·189	0·75
Sheep	15	6·7	8·6	4·3	0·250	0·290	0·97
Pig	10	7·2	4·6	3·1	0·395	0·357	1·05
Rabbit	6	15·5	10·5	2·0	0·89	0·99	2·56

For every 100 lb. of live weight a sheep or a pig requires about 1 lb. of lime and nearly 1 lb. of phosphoric acid, a calf requires about double these amounts and rather more phosphoric acid than lime. As a rule only about one-half of the lime and phosphoric acid supplied in the food can be assimilated and retained, and therefore the actual amount of food consumed should contain at least double the quantities absolutely necessary.

2. The balance or proportion between the different mineral constituents is now recognised to be of importance, and any serious alteration in the balance between two or more elements may affect assimilation, not only of these elements, but also of other constituents of the ration.

3. The relationship between inorganic and organic constituents of rations is shown by the fact that a ration which contains ample amounts of protein fat and carbohydrates may fail to produce normal growth if it is deficient in one or more of the mineral constituents. Addition of such will at once give increased growth and a much better utilisation of the food stuff.

4. Experiments have shown that sunlight and even artificial irradiation, lead to an improved lime and phosphorus assimilation, and may even make up for the want of vitamine D.

5. Diseases due to deficiencies of mineral matters have been reported from all parts of the world, and a concentrated attack to deal with such diseases is being made the last few years throughout the Empire.

Investigations on Phosphorus Deficiency.

Sir Arnold Theiler, with a large staff of workers, made a very complete investigation on phosphorus deficiency as the cause of several diseases in South Africa, which were completely checked by giving the cattle liberal doses of bonemeal.

A full copy of his report appeared three years ago in the "Queensland Agricultural Journal" for March, 1925, and was reprinted in the Journal for September, 1928. Unfortunately, not much notice of the importance of his discovery was taken by readers at the time, and only his personal visit to the Commonwealth gave a fresh stimulus to this matter, more particularly as both he and Dr. J. B. Orr, Director of the Rowett Research Institute, Aberdeen, another oversea visitor to our States, clearly recognised similar wants in our pasture as well as clear signs of malnutrition. The principal sickness due to phosphorus deficiency in South Africa, is the Styfsiekte or stiffsickness, with its most obvious outward sign of bone chewing, or osteophagia. This is a specific form of depraved appetite, showing by cattle having a predilection for bones, chiefly bleached bones. In more aggravated cases even putrifying bones and rotten carcasses are eaten. The animals are easily tested in practice if they are marked cravers, slight cravers, or non-cravers, which is very useful for experimental purposes. The osteophagia is a precursor of serious diseases, stunted growth, poor condition, and heavy mortality. Feeding the animals with 3 oz. of bonemeal per head per day absolutely controls the disease, and enormously improves the condition of the cattle.

A few diagrams shown in Sir Arnold Theiler's report, which was republished in full in September (1928) number of the Journal, clearly demonstrate the improvement in growth, increase of food consumed, &c. Particularly interesting is the quick change which takes place when batches of the experimental animals have their treatment reversed, the controls receiving bonemeal, and the bonemeal withdrawn from others. The change in the animals manifests itself in a very short time, and the recovery of some is simply marvellous.

Seasonal changes should also be noted, and the quick improvement in cattle following spring rains.

The phosphorus was supplied in various forms, but the results obtained were the same. Addition of lime did not prevent osteophagia, but rather increased the evil. Bonemeal as the best and cheapest form of phosphatic available in South Africa was chosen for general use. Mineral phosphates were tried, but were found too costly and rather difficult of digestion; superphosphate was found to cause digestive troubles. Precipitated calcium phosphate behaved very much like bone phosphate.

We are very fortunate in Queensland that we have in finely-crushed Nauru and Ocean Island phosphate, a comparatively cheap natural, pure, tricalcic phosphate which can be safely and successfully used in place of bonemeal.

Unfortunately, manufacturers of proprietary licks, a great number of which were sold at exorbitant prices, although consisting chiefly of common salt, spread pernicious and what proved to be absolutely unfounded reports on the ill effects alleged to follow the use of finely-ground Nauru phosphate, which I generally recommend as the chief ingredient of a lick, stating that this phosphate causes ulceration of the bowels, causes the teeth to become loose, detrimentally affects the quality of the wool clip, and is actually harmful on account of the small amount of calcium fluoride found in Nauru phosphate. The authors of these statements overlooked the fact that even in bones as much as 2 per cent. of calcium fluoride exists, and they quoted absurd experiments in which doses of the highly soluble sodium fluoride were given to rats with their food, producing ill effects. It is well known that sodium fluoride is a powerful insecticide and germicide, and therefore poisonous, but the practically insoluble calcium fluoride is quite harmless. As a matter of fact, on one station where the manager was ordered by his directors, scared by these reports, to substitute bonemeal for the Nauru phosphate, which had been successfully used hitherto, it was found that the sheep refused to take the bonemeal-salt lick, and they had to return to the Nauru phosphate-salt lick. On another large station where Nauru phosphate-salt lick was used for over three years with the most beneficial results, increasing the flocks by over 50 per cent. and improving the percentage of lambing and the health of sheep which all had excellent teeth, the last wool clip was of particularly high quality, obtaining top prices in the market. Experiments made in America twenty years ago supplying pigs with various forms of phosphate proved clearly that the form in which phosphorus was supplied in the food was practically immaterial and all gave equally good results.*

There is practically no difference in the solubility in weak acids of finely-crushed Nauru phosphate and bonemeal, but the latter should always be specially sterilised when used as lick. Bone char, bone ash could also be used, but the use of superphosphate must be generally condemned, and Sir Arnold Theiler distinctly states that superphosphate used as lick produces digestive disturbances.

Application of phosphatic fertilisers to pasture, in South Africa using 500 lb. superphosphate per acre, produced the same results as bonemeal feeding, but, of course, this is of not much practical value to our pastoralists, as phosphatic manuring on a large scale would not be an economical proposition.

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*Research Bulletin, No. 1 of the Agricultural Research Station of the University of Wisconsin, U.S.A., June, 1909.

The want of phosphorus was traced by Sir Arnold Theiler and his co-workers to the pastures and to the soil itself, and in all the affected areas, the soil showed a great lack in available phosphoric acid, being generally less than .001 per cent.

There can be no doubt that our stock suffer to some extent, more so in certain districts, from a phosphorus deficiency, which becomes more evident and pronounced in drought periods. A supply of phosphorus just or barely sufficient for maintenance is quite inadequate for reproduction and growth. Sir Arnold Theiler's results showed that a breeding cow requires in the earliest stage of pregnancy only about 2 oz. of bonemeal per head per week more than an ox, whereas in an advanced stag of pregnancy as much as 28 oz. bonemeal per week were required to prevent osteophagia.

Comparison of Composition of Pasture Grasses.

Of particular interest is the study of the following table giving the composition of pasture grasses as found in South Africa, in Queensland, &c., as compared with good European pasture.

—	ANALYSIS OF WATER-FREE MATERIAL.				
	Protein.	Fibre.	Ash.	CaO.	P_2O_5.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Fattening Pasture, Romney Marsh, eaten ..	22·9	20·2	8·7	0·99	1·01
Fattening Pasture, Romney Marsh, non-eaten	13·5	28·2	5·6	0·75	0·65
Non-fattening Romney Marsh, eaten.. ..	21·1	20·2	7·6	0·90	0·89
Non-fattening Romney Marsh, non-eaten ..	12·3	29·2	5·6	0·73	0·58
Poor Average Pasture, England, eaten ..	15·9	25·2	5·5	0·56	0·60
Poor Average Pasture, England, non-eaten ..	11·4	29·3	3·1	0·30	0·37
Pasture, Falkland Island, eaten	12·2	..	4·6	0·29	0·54
Pasture, Falkland Island, non-eaten	7·0	..	2·5	0·14	0·25
Mixed Pasture, South Africa, November ..	19·4	22·5	11·6	0·31	0·60
Mixed Pasture, South Africa, January ..	13·8	25·0	7·7	0·50	0·22
Mixed Pasture, South Africa, March	7·2	33·7	5·9	0·43	0·24
Mixed Pasture, South Africa, May	4·1	34·9	5·9	0·50	0·07
Mitchell Grass, Queensland, green, 1926-27 ..	7·9	31·7	10·9	0·62	0·38
Mitchell Grass, Queensland, yellow, 1926-27..	6·0	28·9	10·7	0·44	0·20
Mitchell Grass, Queensland, roughage, 1926-27	2·8	32·9	10·0	0·38	0·12
Mitchell Grass, Queensland, young, 12in. long, 1929	18·8	27·6	12·6	1·09	0·51
Mitchell Grass, Queensland, young, 18in. long, 1929	17·1	30·9	14·7	1·07	0·53
Mixed Pasture, Queensland, average of 15 samples, 1914	6·3	41·2	11·9	0·49	0·45
Roughage, Queensland, average of 40 samples, 1928	3·3	33·2	10·2	0·44	0·16
Young Grasses, Queensland, average of 40 samples, 1929	10·0	32·7	11·3	0·69	0·46
Paspalum, Queensland, unfertilised, 9 days old, 1927-28	8·2	25·4	12·7	0·72	0·55
Paspalum, Queensland, unfertilised, 44 days old, 1927-28	6·8	29·8	11·9	1·15	0·37
Paspalum, Queensland, fertilised, 9 days old, 1927-28	15·5	24·1	13·3	0·50	0·66
Paspalum, Queensland, fertilised, 44 days old, 1927-28	7·4	35·9	10·2	0·63	0·40
Rhodes Grass, Queensland, 6 weeks old ..	13·7	33·9	9·4	0·49	0·39
Rhodes Grass, Queensland, 3 months old ..	7·1	34·8	9·7	0·41	0·23
Kikuya Grass, Queensland, old	5·2	26·9	12·3	0·75	0·55
Kikuya Grass, Queensland, 4 weeks old ..	15·8	25·5	8·9	0·59	0·71

The most striking feature is the high percentage of protein, lime, and phosphoric acid, calculated on the water free material, found in the pastures readily eaten by sheep on Romney Marsh, England. The pasture not eaten is still very much richer than the best of our own pastures. On Falkland Island, which is heavily stocked, a considerable falling off in the stamina of the sheep has been noted and is due to the fact that the pasture was never fertilised. The mineral constituents lime and phosphoric acid are very low. The great falling off in nutritious quality of the South African pastures with age is clearly shown, more particularly the great reduction in the phosphoric acid contents of the ash, which is quite good in November, becomes already low in January and March, and falls away to practically nothing in May.

A similar condition exists in the Mitchell grass pasture and a distinct want of phosphoric acid in the older growth is to be noticed.

The great increase in the protein contents of paspalum pasture due to application of a complete fertiliser, with an extra supply of nitrogenous manure, is also worth noting.

Lack of Protein.

It has been found that the supply of lick will lead to greater consumption of fodder, and greatly help in the digestion and assimilation of all nutrients, but after all it cannot create protein if it is not there, and the actual value of a feed must depend principally on the amount of protein it supplies. I have repeatedly expressed the opinion that our stock are suffering for long periods of their existence of a protein starvation, with or without lime and phosphorus deficiencies. Lime itself is but very rarely deficient, but phosphorus is, although not in such a pronounced degree as found by Sir Arnold Theiler in South Africa. Only in very isolated cases our soils contain less than 0.01 per cent. of available phosphoric acid, which means about 300 lb. per acre foot, whereas the soils in South Africa, showing disease, have only .001 per cent. or 30 lb. per acre foot. For years very full analyses of grasses, fodders, &c., have been carried out in our agricultural laboratory, and only in a very few cases such low amounts of phosphoric acid have been found in the samples as are recorded in South Africa.

Sheep Affected by Malnutrition.

Sheep will be affected by malnutrition in a similar manner, although the outward symptoms are rarely so pronounced as with cattle. Bone chewing, and more frequently licking up of earth, are noticed; an excessive liking for salt is also an indication of depraved appetite. The fact of sheep licking certain soil does not indicate that such soil would make a good lick, as many a correspondent to this Department has asserted, but is simply a sign of depraved appetite due to malnutrition. The far-reaching results of malnutrition are shown by stunted growths, loss of fecundity, poor percentage of lambing, great mortality among young lambs, greater liability to suffer from worms, and attack by blow flies. Of course all these symptoms become more pronounced during periods of drought. A large number of pastoralists tried to save their sheep from starvation by giving them salt licks, and in many cases where the drinking water was also saline, actually killed the sheep through salt poisoning. The actual amount of salt required by sheep is extremely small, only about 4 to 5 lb. of salt are required per annum, and this quantity is generally fully supplied in the pasture grass, and drinking water. The other mineral constituents, lime and phosphoric acid necessary for the maintenance of an adult sheep, are generally supplied by good natural pasturage, but in the case of ewes the requirements increase rapidly during pregnancy and remains high during the lactating period, so that the amounts supplied by pasturage are in a great number of places not sufficient to cover the demand. The requirements of a young growing lamb are equally high, and from two to three times greater than those of an adult sheep.

The actual amounts of lime and phosphoric acid removed from the soil by wool and sheep are very small, amounting to a few ounces per acre annually; even with fairly heavy stocking of, say, one sheep to 2½ acres, the amount of lime phosphate removed would be approximately only 1 lb. per acre per annum; so that, with an average amount of one-hundredth of a per cent. of available phosphoric acid in a soil, the supply would last many hundred years. Unfortunately, the situation is not quite as favourable as it appears at first sight. Stock naturally prefer the best and most succulent fodders and remain in such localities, and as a consequence the best and most nutritious grasses are eaten out continually and are likely to disappear and be replaced by coarse, poor varieties. As previously pointed out, amounts of mineral constituents must be available in large excess, both for vegetable and animal growth.

Analyses of Soil.

Mr. J. E. Thomas, when making his investigation on the feeding of sheep under drought condition, drew particular attention to the great difference between the pebbly and rolling downs in Central Queensland with regard to nutritive value and palatability of the grasses. The pebbly downs always show a much higher lambing percentage, better growth and yield of wool. These facts were explained by analyses of the soils made in our laboratory. The physical condition of the pebbly downs soil was much better than that of the clayey downs, showing much better capillarity. Humus and nitrogen contents of both soils were rather low, lime plentiful both total and available amounts, the amount of available phosphoric .0195 per cent. in pebbly downs soil against .0014 per cent. in clayey down soil, which is dangerously low. The actual amount of feed grown in good seasons is much larger on the rolling downs soil, but the fodder is not so well relished as the sparser growth, but more varied and palatable feed of the pebbly downs.

The principal fodder grass in the western country is Mitchell grass, which is the most drought resistant of our grasses, but its nutritive value is generally very much overrated. The quality varies very much according to seasons, as shown by a great number of analyses, but is at its best in its young growth.

Flinders grass requires a better rainfall than Mitchell grass, but is a more nutritious and more palatable grass, even in the drying-off stage.

Blue grasses require a still heavier and more evenly distributed rainfall and are highly nutritious in their earliest stages of growth, but lose their nutrition value very quickly when drying off.

Edible herbs and shrubs are available in most districts, although restricted in the main areas of Central and Northern-West Queensland.

Looking over the list of analyses of such fodder plants published in the annual report, it will be noted many of them are of high food value. The prickly acacia bush and trefoil, Medick burr, stand out on their own on account of high protein contents, and are therefore greatly relished by stock.

Food Supply in Time of Drought.

The greatest problem facing the stockowner is the feeding during drought periods. From the previous remarks it is quite evident that the roughage available in such periods is of exceedingly low feeding value, and therefore the problem resolves itself into supplies of proteins, minerals, and roughage itself.

Proteins can be supplied principally in forms of maize and other grains, and prepared concentrated fodders in the form of nuts or cubes, in which mixtures of all sorts of grains, by-products, and milling offals can be utilised with advantage.

Lucerne hay is of great value, being high in protein and minerals, and at the same time is a palatable roughage, but, unfortunately, high cost limits extensive use. The supply of roughage is the most serious problem in drought time, as it is quite impossible to maintain sheep on licks or grains alone.

What could be done with regard to conservation of fodder for roughage, bush hay, and perhaps in some cases fodder crops, chiefly sorghums, are problems of the future. In the meantime the liberal use of phosphatic licks will improve matters, and stock should be allowed to make the best use of poor coarse fodders, this being advantageous to the grazier in good and bad seasons.

Licks Recommended.

The lick at present recommended, and already successfully used in several places, is made by mixing one part of coarse salt (free from large lumps) with two parts finely ground Nauru or Ocean Island phosphate.

Nauru phosphate is an excellent substitute for bonemeal, as it is cheaper and contains a much higher percentage of lime and phosphoric acid than bonemeal.

The use of phosphatic licks is of particular importance when feeding on scrub, as practically all our western scrub trees contain in the ash of their leaves a very large amount of lime and very little phosphoric acid. Any large excess of lime accentuates the want and deficiency of phosphorus.

When feeding very dry, coarse roughage, the addition of small amounts of Epsom salts, about 10 lb. to every 100 lb. of lick, is advisable. In very rare cases the addition of about 3 to 5 per cent. of flowers of sulphur, and/or 2 to 3 per cent. of iron sulphate (green vitriol) may have a beneficial effect.

Quantity of Licks to be Supplied.

It is of importance that the stockowner has a rough idea how much lick the animals actually consume; a lamb or a wether should get about 2 oz. of phosphate, or 3 oz. of the mixed lick per week; a ewe with lamb can get up to 6 oz. of phosphate per week. As the Nauru phosphate has neither taste nor odour, the animals in some cases do not take readily to the lick, and in such cases sprinkling the lick with a little molasses, or adding about 5 to 10 per cent. of linseed meal, or any other meal to the lick will induce the animals to eat the lick more readily. The addition of these materials is discontinued or reduced when a sufficient amount of lick is consumed. An extra amount of phosphate will not hurt the sheep, but an increased amount of salt may do serious harm. Keep a supply of lick going the whole year round, so that the animals can get it any time they want it.

If the drinking water is distinctly saline, the use of salt in the lick should be omitted altogether, and a small amount of meal or molasses used in its place.

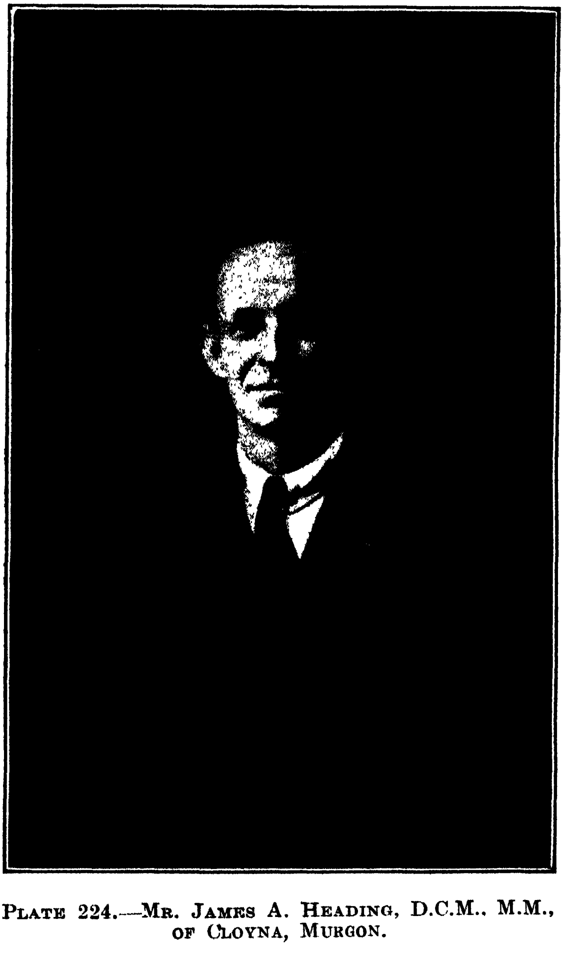

PLATE 224.—MR. JAMES A. HEADING, D.C.M., M.M., OF CLOYNA, MURGON.

At a meeting of the Board of Directors of the Queensland Co-operative Bacon Association, Limited, Murarrie, Queensland, recently, Mr. Heading was re-elected Chairman of Directors. He is also a Director of the Farmers' Co-operative Distributing Association, Limited, and of the South Burnett Co-operative Dairy Company, Limited, besides being Chairman of the Murgon Shire Council and a member of the executive of the Local Producers' Association of Queensland.

A progressive and successful farmer, Mr. Heading is a keen advocate of co-operation, and is one of our best known leaders in agricultural organisation. He is also associated with the Australian Pig Industry Council and is a member of the Queensland Pig Industry Committee.

RATIONS FOR DAIRY COWS.

E. H. GURNEY, Senior Analyst.

Feeders of dairy stock frequently forward to the Department lists of feed materials available to them, desiring to know how to make balanced rations from such material. On account of this it was thought that examples of rations made up with various feeds might prove useful, some of the examples being composed of feedstuffs named in the lists mentioned above.

The Agricultural Chemist, Mr. J. C. Brünnich, has written a pamphlet entitled "Stock Foods," in which the objects of feeding, description and analyses of various stock foods, and the making up of rations are all very fully detailed, and with this information the dairy farmer can judge how to feed to the best advantage.

Modern experience has shown that rations with somewhat lower protein content than was previously considered necessary can be successfully used.

Examples of rations computed from analyses of feedstuffs contained in "Stock Foods" are given below, and are in accordance with the feeding standards for dairy cows published in "Feeds and Feeding Abridged," by Henry and Morrison.

Professor J. K. Murray states that this standard is referred to in lectures in the Agricultural Course at the Queensland University.

HENRY AND MORRISON FEEDING STANDARD.

——	Digestible Crude Protein.	Total Digestible Nutrients.
Dairy Cows.		
For maintenance of a 1,000-lb. cow	0·700	7·925
To allowance for maintenance add—		
For each 1 lb. of 2·5 per cent. milk ..	0·045—0·053	0·230—0·256
For each 1 lb. of 3·0 per cent. milk ..	0·047—0·057	0·257—0·286
For each 1 lb. of 3·5 per cent. milk ..	0·049—0·061	0·284—0·316
For each 1 lb. of 4·0 per cent. milk ..	0·054—0·065	0·311—0·346
For each 1 lb. of 4·5 per cent. milk ..	0·057—0·069	0·338—0·376
For each 1 lb. of 5·0 per cent. milk ..	0·060—0·073	0·362—0·402
For each 1 lb. of 5·5 per cent. milk ..	0·064—0·077	0·385—0·428
For each 1 lb. of 6·0 per cent. milk ..	0·067—0·081	0·409—0·454
For each 1 lb. of 6·5 per cent. milk ..	0·072—0·085	0·434—0·482
For each 1 lb. of 7.0 per cent. milk ..	0·074—0·089	0·454—0·505

Then upon this standard, a 1,000-lb. cow, yielding 25 lb. of milk of 3.5 per cent. fat, would require from a minimum amount of digestible crude protein 0.049 × 25 = 1.225 + 0.7 = 1.925 lb. to a maximum amount 0.061 × 25 = 1.527 + 0.7 = 2.225 lb.; and this cow would require from a minimum amount of total digestible nutrients 0.284 × 25 = 7.1 + 7.925 = 15.025 lb. to a maximum amount 0.316 × 25 = 7.900 + 7.925 = 15.825 lb.

Again, a 1,000-lb. cow, yielding 25 lb. of milk of 4.0 per cent. fat, would require from 2.05 lb. to 2.325 lb. digestible crude protein, and from 15.7 lb. to 17.57 lb. total digestible nutrients.

The term "nutritive ratio" means that amount of digestible protein that exists in a feed compared with the amount of non-nitrogenous digestible nutrients in that feed. As fat is capable of producing more heat when digested than the other nutrients, the fat content in the following rations has been multiplied by 2.3. and the product added to the amount of digestible carbohydrate and fibre—this total divided by the digestible protein gives the "nutritive ratio" of the ration. Thus in No. 1 ration, there is one part of digestible protein to six parts of other digestible nutrients.

When considering rations for animals it must be understood that other factors, beside the digestible crude protein and total digestive nutrients supplied to the animal, must be taken into account, such as succulence, palatability, and variety of feeds.

Proteins are very complex bodies, and different proteins yield different substances when digested, and a number of these different substances have to be supplied by the food for satisfactory nutrition. Therefore there is less chance of feeding an unbalanced protein content by using several feedstuffs, than by using only one or two.

Rations are useful guides in feeding, but it must be noted that the analyses of the feedstuffs from which they are computed are averages only—that is to say, the composition of the feedstuffs varies according to soil and climate wherein grown, and particularly to the age of growth when harvested.

The legumes, such as lucerne, cowpea, clover, &c., are characterised by the high amount of phosphorus and lime (particularly lime) they contain. Therefore, when animals graze on grass pastures growing upon soils deficient in phosphoric acid and lime, the inclusion of a legume in a ration is of particular value to these animals supplying both protein and mineral matter. Bran is also relatively rich in phosphorus.

There is in very many cases a deficiency of phosphoric acid in the pasture grazed by dairy stock. Where such deficiency occurs the rations should be supplemented by the addition of from 2 to 4 oz. of a mixture of finely ground Nauru phosphate and salt. The mixture is in the proportion of two parts by weight of finely ground Nauru phosphate to one part by weight of salt.

Another consideration is the cost of a particular ration—whether it pays, when it is compared with the price obtained from the milk produced. But care should be taken that blame for unprofitable feeding is not placed upon the ration, when the fault is due to the cow. Some cows are capable of producing a large amount of milk, other cows are only capable of yielding a small amount of milk, even when supplied with ample well-balanced feed; such poor producers do not pay, and should be culled out from the herd.

Rations per 1,000-lb. Cow Yielding 25 lb. Milk.

—	Dry Matter.	Digestible Nutrients.				Total Digestible Nutrients.	Nutritive Ratio.
		Crude Protein.	Fat.	Carbo-hydrates.	Fibre.		
	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	
1.—							
40 lb. Green Sorghum ..	8·0	0·48	0·08	2·32	1·36		
60 lb. Mixed Pasture (average)	12·0	0·53	0·12	3·48	3·01		
8 lb. Lucerne Chaff ..	7·4	1·24	0·05	2·22	0·67		
	27·4	2·25	0·25	8·02	5·04	15·5	1 ÷ 6·0
2—							
65 lb. Green Sorghum ..	13·0	0·78	0·13	3·76	2·14		
7 lb. Lucerne Chaff ..	6·4	1·08	0·04	1·95	0·58		
7 lb. Maize Meal	6·0	0·35	0·21	4·20	0·07		
	25·4	2·21	0·38	9·91	2·79	15·3	1 ÷ 6·1
3—							
45 lb. Green Sorgum ..	9·0	0·54	0·09	2·61	1·49		
13 lb. Wheat Chaff ..	11·3	0·27	0·12	3·39	2·04		
3 lb. Bran	2·6	0·37	0·05	1·21	0·10		
2¾ lb. Cotton Seed Meal (decorticated)	2·5	0·96	0·17	0·54	0·06		
2 lb. Molasses ..	1·5	0·02	..	1·15	..		
	27·9	2·16	0·43	8·90	3·69	15·2	1 ÷ 6·2

RATIONS FOR DAIRY COWS—*continued.*

RATIONS PER 1,000-LB. COW YIELDING 25 LB. MILK—*continued.*

—	Dry Matter.	Digestible Nutrients.				Total Digestible Nutrients.	Nutritive Ratio.
		Crude Protein.	Fat.	Carbo-hydrates.	Fibre.		
	Lb.	Lb.	Lb.	Lb.	Lb.		
4—							
50 lb. Green Sorghum	10·0	0·60	0·10	2·90	1·70		
40 lb. Green Cowpea	8·8	0·64	0·12	2·92	1·14		
3 lb. Bran	2·6	0·37	0·05	1·21	0·10		
1¾ lb. Cotton Seed Meal (decorticated)	1·6	0·61	0·11	0·34	0·03		
4 lb. Molasses	3·0	0·04	..	2·29	..		
	26·0	2·26	0·38	9·66	2·97	15·3	1 ÷ 5·5
5—							
42 lb. Sorghum Silage ..	10·7	0·38	0·08	3·06	2·06		
9 lb. Lucerne Chaff ..	8·3	1·39	0·06	2·49	0·75		
7 lb. Maize Meal	6·0	0·35	0·21	4·20	0·07		
	25·0	2·12	0·35	9·75	2·88	15·1	1 ÷ 6·3
6—							
35 lb. Sorghum Silage ..	8·9	0·31	0·07	2·55	1·71		
5 lb. Lucerne Chaff ..	4·6	0·77	0·03	1·38	0·42		
6 lb. Wheat Chaff ..	5·3	0·12	0·05	1·56	0·96		
2 lb. Linseed Oil Meal ..	1·8	0·44	0·15	0·63	0·09		
3 lb. Pollard	2·7	0·41	0·09	1·62	0·06		
3 lb. Rice Meal	2·7	0·20	0·28	1·50	0·06		
	26·0	2·25	0·67	9·24	3·30	15·5	1 ÷ 6·2
7—							
65 lb. Green Maize ..	11·7	0·65	0·19	3·90	2·01		
8 lb. Lucerne Chaff ..	7·4	1·24	0·05	2·22	0·67		
7 lb. Maize Meal ..	6·0	0·35	0·21	4·20	0·07		
	25·1	2·24	0·45	10·32	2·75	15·7	1 ÷ 6·3
8—							
54 lb. Green Maize	9·7	0·54	0·16	3·24	1·67		
10 lb. Wheat Chaff	8·7	0·21	0·09	2·61	1·57		
3 lb. Maize Meal	2·6	0·15	0·09	1·80	0·03		
3 lb. Bran	2·6	0·37	0·05	1·21	0·10		
2¾ lb. Cotton Seed Meal (decorticated)	2·5	0·96	0·17	0·54	0·06		
	26·1	2·23	0·56	9·40	3·43	5·6	1 ÷ 6·3
9—							
30 lb. Maize Silage	9·0	0·30	0·09	3·21	1·56		
5 lb. Good Bush Hay ..	4·6	0·14	0·03	1·20	1·13		
4 lb. Cowpea Chaff ..	3·6	0·45	0·07	0·76	0·54		
5 lb. Maize Meal	4·4	0·25	0·15	3·00	0·05		
3 lb. Cocoanut Cake ..	2·6	0·40	0·21	1·19	0·20		
1 lb. Blood Meal	0·9	0·67	0·01	0·05	..		
	25·1	2·21	0·56	9·41	3·48	15·6	1 ÷ 6·4

RATIONS FOR DAIRY COWS—*continued.*

Rations per 1,000-lb. Cow Yielding 25 lb. Milk—*continued.*

—	Dry Matter.	Digestible Nutrients. Crude Protein.	Fat.	Carbo-hydrates.	Fibre.	Total Digestible Nutrients.	Nutritive Ratio.
	Lb.	Lb.	Lb.	L.B.	Lb.	Lb.	
10—							
35 lb. Maize Silage ..	10·5	0·35	0·10	3·75	1·82		
8 lb. Lucerne Chaff ..	7·4	1·24	0·05	2·22	0·67		
7 lb. Barley Meal	6·2	0·65	0·06	4·27	0·21		
	24·1	2·24	0·21	10·24	2·70	15·4	1 ÷ 6·0
11—							
80 lb. Green Paspalum ..	20·0	1·20	0·16	5·60	4·96		
6 lb. Lucerne Chaff ..	5·5	0·93	0·04	1·67	0·50		
	25·5	2·13	0·20	7·27	5·46	15·0	1 ÷ 1·6
12—							
67 lb. Green Paspalum ..	16·5	1·00	0·13	4·69	4·15		
3 lb. Maize Meal	2·6	0·15	0·09	1·80	0·03		
3 lb. Bran	2·6	0·37	0·05	1·21	0·10		
2 lb. Cotton Seed Meal (decorticated)	1·8	0·70	0·13	0·39	0·04		
	23·5	2·22	0·40	8·09	4·32	15·0	1 ÷ 6·0
13—							
100 lb. Sudan Grass	22·0	1·50	0·10	7·50	3·80		
4½ lb. Lucerne Chaff ..	4·1	0·70	0·03	1·25	0·37		
	26·1	2·20	0·13	8·75	4·17	15·3	1 ÷ 6 0
14—							
100 lb. Sudan Grass ..	22·0	1·50	0·10	7·50	3·80		
3 lb. Bran	2·6	0·37	0·05	1·21	0·10		
1 lb. Cotton Seed Meal (decorticated)	0·9	0·35	0·07	0·19	0·02		
	25·5	2·22	0·22	8·90	3·92	15·3	1 ÷ 6·0
15—							
50 lb. Sudan Grass	11·0	0·75	0·05	3·75	1·90		
8 lb. Wheat Chaff	7·0	0·16	0·07	2·09	1·29		
4 lb. Lucerne Chaff ..	3·7	0·62	0·02	1·11	0·33		
3 lb. Maize Meal	2·6	0·15	0·09	1·80	0·03		
2 lb. Linseed Oil Meal ..	1·8	0·44	0·15	0·63	0·09		
	26·1	2·12	0·38	9·38	3·64	15·5	1 ÷ 6 5
16—							
20 lb. Green Oats	4·6	0·28	0·08	1·30	0·98		
8 lb. Lucerne Chaff ..	7·4	1·24	0·05	2·22	0·67		
10 lb. Wheat Chaff	8·8	0·21	0·09	2·61	1·61		
3 lb. Cocoanut Cake ..	2·6	0·40	0·22	1·19	0·20		
3 lb. Molasses	2·3	0·03	..	1·72	..		
	25·7	·162	0·45	9·04	3·46	15·1	1 ÷ 6·3

RATIONS FOR DAIRY COWS—*continued.*

RATIONS PER 1,000-LB. COW YIELDING 25 LB. MILK—*continued.*

——	Dry Matter.	Digestible Nutrients.				Total Digestible Nutrients.	Nutritive Ratio.
		Crude Protein.	Fat.	Carbo-hydrates.	Fibre.		
	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	
17—							
25 lb. Green Barley ..	5·2	0·45	0·10	1·50	1·07		
13 lb. Wheat Chaff	11·4	0·27	0·11	3·40	2·10		
6 lb. Lucerne Chaff ..	5·5	0·93	0·04	1·67	0·50		
2 lb. Linseed Oil Meal ..	1·8	0·44	0·15	0·63	0·09		
3 lb. Molasses	2·3	0·03	..	1·72	..		
	26·2	2·12	0·40	8·92	3·76	15·2	1 ÷ 6·4
18—							
60 lb. Sugar-cane Tops ..	16·8	1·02	0·18	5·64	3·90		
10 lb. Cowpea Chaff ..	9·2	1·12	0·19	1·90	1·35		
	26·0	2·12	0·37	7·54	5·25	15·3	1 ÷ 6·4
19—							
50 lb. Sugar-cane Tops ..	14·0	0·85	0·15	4·70	3·25		
30 lb. Green Cowpea ..	6·6	0·48	0·09	2·19	0·84		
5 lb. Lucerne Chaff ..	4·6	0·77	0·04	1·38	0·42		
	25·2	2·10	0·28	8·27	4·51	15·2	1 ÷ 6·3
20—							
35 lb. Elephant Grass ..	7·0	0·32	0·07	2·03	1·75		
35 lb. Imphee	7·0	0·42	0·07	2·03	1·15		
8 lb. Lucerne Chaff ..	7·4	1·24	0·05	2·22	0·67		
5 lb. Maize Meal	4·4	0·25	0·15	3·00	0·05		
	25·8	2·23	0·34	9·28	3·62	15·5	1 ÷ 6·1
21—							
35 lb. Elephant Grass ..	7·0	0·32	0·07	2·03	1·75		
35 lb. Imphee	7·0	0·42	0·07	2·03	1·15		
10 lb. Pumpkins	1·7	0·15	0·06	0·80	0·16		
7 lb. Lucerne Chaff ..	6·4	1·08	0·04	1·95	0·58		
5 lb. Maize Meal	4·4	0·25	0·15	3·00	0·05		
	26·5	2·22	0·39	9·81	3·69	16·1	1 ÷ 6·4
22—							
65 lb. Mixed Pasture (average)	13·0	0·57	0·13	3·77	3·26		
9 lb. Lucerne Chaff ..	8·3	1·39	0·05	2·50	0·75		
5 lb. Maize Meal	4·4	0·25	0·15	3·00	0·05		
	25·7	2·21	0·33	9·27	4·06	15·8	1 ÷ 6·3
23—							
15 lb. Poor Bush Hay ..	14·0	0·21	0·08	2·77	3·03		
10 lb. Pumpkins	1·7	0·15	0·06	0·80	0·16		
5 lb. Lucerne Chaff ..	4·6	0·77	0·03	1·38	0·42		
7 lb. Maize Meal	6·1	0·35	0·21	4·20	0·07		
1 lb. Blood Meal	0·8	0·66	0·02	0·06	..		
	27·2	2·14	0·40	9·21	3·68	15·4	1 ÷ 6·4
24—							
65 lb. Prairie Grass ..	15·1	1·95	0·26	4·29	2·75		
5 lb. Wheat Chaff	4·4	0·10	0·04	1·30	0·80		
5 lb. Maize Meal	4·4	0·25	0·15	3·00	0·05		
1 lb. Molasses	0·7	0·01	..	0·57	..		
	24·6	2·31	0·45	9·16	3·60	15·5	1 ÷ 5·9

It has been mentioned before that better results are obtained from rations composed of a variety of feed ingredients than from a ration made up with only one or two feedstuffs.

A very convenient method is to have on hand a quantity of the concentrates already mixed, and then to feed a certain quantity of this mixture with the roughage that is being used, increasing the quantity of the mixture used until it is noticed that no further increased milk production is obtained. An example of this procedure has been published in the "Live Stock Bulletin" under the heading of "4-2-1" plan; this meaning that a concentrate mixture is made of four parts maize meal, two parts ground oats, and one part linseed meal. The above mentioned paper recommends the following:—3 lb. of silage and 1 lb. of legume hay for every 100 lb. of the animal's body weight, and to gradually increase the amount given of the concentrate mixture until the cow is getting 1 lb. for every 5 lb. of milk produced. Thus a 1,000-lb. cow, yielding 25 lb. of milk, would be given a ration of 30 lb. maize silage, 10 lb. lucerne hay, and 5 lb. of the concentrate mixture—containing 2.26 lb. digestible crude protein and 13.6 lb. total digestible nutrients. This ration has the amount of digestible crude protein required by the Henry and Morrison standard, but has a somewhat lower amount of total digestible nutrients. Other concentrates can be used in this convenient manner.

For instance, a concentrate mixture could be prepared by mixing eight parts maize meal, one part bran, and one part cotton seed meal. This mixture would have the following composition:—

—	Dry Matter.	Digestible.			
		Crude Protein.	Fat.	Carbo-hydrates.	Fibre.
	Lb.	Lb.	Lb.	Lb.	Lb.
1 lb. Concentrate Mixture	0·87	0·088	0·032	0·539	0·014
5 lb. Concentrate Mixture	4·3	0·44	0·16	2·69	0·07

If 4 lb. maize silage and 1 lb. lucerne chaff be used for every 100 lb. live weight, and 1 lb. of the above concentrate mixture for every 5 lb. of milk produced, the following will be the ration for a 1,000-lb. cow yielding 25 lb. of milk:—

—	Dry Matter.	Digestible.				Total Digestible Nutrients.	Nutritive Ratio.
		Crude Protein.	Fat.	Carbo-hydrates.	Fibre.		
	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	
40 lb. Maize Silage	12·0	0·40	0·12	4·27	2·08		
10 lb. Lucerne Chaff	9·2	1·55	0·07	2·77	0·84		
5 lb. Concentrate Mixture ..	4·3	0·44	0·16	2·69	0·07		
	25·5	2·39	0·35	9·73	2·99	15·5	1 ÷ 5·6

The amount of digestible crude protein is a little higher in this ration than is required by the standard.

The following extracts from the "Agricultural Gazette" of New South Wales, December, 1927, are given as an illustration of what complete feeding, when combined with high milk-producing power, can accomplish:—

"On 15th October, 1927, Wagga Gladys, the seven-year old Jersey cow of the Hawkesbury Agricultural College herd, completed 365 days' official test for a yield of 20,835 lb. milk, with an average test of 5.52 per cent. and 1,149.385 lb. butter fat, which is equivalent to 1,384.8 lb. commercial butter. This is an official world's record for both milk and butter fat production for the Jersey breed. It was achieved on twice-a-day milking, whereas all the great records in other countries have been made on three and four milkings a day. Wagga Gladys calved on 9th November, 1926, and on the day of her last periodical test she yielded 53.5 lb. milk and 3.694 lb. butter fat in twenty-four hours."

The following is extracted from the "Agricultural Gazette" of New South Wales, October, 1927, and shows the ration fed to Wagga Gladys, together with the record of her 273 days' performance:—

"On her present lactations as a seven-year-old, which is still in progress, she has produced for the first nine-months' period 15,951 lb. milk, of 5.3 per cent. test, 839.814 lb. butter fat, being equal to 1,011.8 lb. commercial butter. . . . On the hypothesis that feeding must be linked with breeding to secure high production, an indication of the ration fed to Wagga Gladys may be given.

"*Concentrates.*—The following mixture was fed daily at the rate of 1 lb. to every 3½ lb. milk produced:—300 lb. maize meal, 200 lb. bran, 100 lb. crushed oats, 50 lb. linseed meal. During March and April the mixture was altered by the substitution of 25 lb. cotton seed meal for 25 lb. of the linseed meal.

"*Bulk Ration.*—The daily bulk ration consisted of:—25 lb. maize silage, 10 lb. lucerne chaff (of poor quality during May), 3 lb. bran, and 1½ lb. linseed meal. During March and April half the linseed meal was replaced by an equal amount of cotton seed meal. During the latter half of the month of March the silage was replaced by an equal amount of green corn stalks chaffed.

"*Grazing.*—The pastures were very poor, except after the Easter rain. In December, Wagga Gladys was grazed on a poor stand of green lucerne for two days prior to test. In January, she was grazed on green lucerne for two hours daily for a week previous to test. In February, March, and April, she was grazed on green lucerne for two hours daily, and in May and June for one hour daily. In July, green oats were given for a week previous to the test; Gladys and the whole herd went off in butter fat yield this month, and the green oats were blamed. In August, she was grazed on green lucerne for two hours daily."

It will be interesting to compare the above mentioned cow's milk production and her feeding, with the standard used in computing the examples of rations previously given. The weight of Wagga Gladys is not known, and though it may not be 1,000 lb. live weight, this figure will be used for the sake of comparison.

The cow produced 15,951 lb. milk in 273 days—that is, 58.4 lb. of milk per day, of 5.3 per cent. fat. Using the minimum requirements of the standard the cow should receive 4.32 lb. digestible crude protein and 29.7 lb. total digestible nutrients.

The cow produced on an average 58.4 lb. of milk per day, and it is stated that for every 3½ lb. of milk produced 1 lb. of the mixed concentrate was given, therefore, 16.6 lb. mixed concentrate was fed daily. The following is the total ration fed:—

—	Dry Matter.	DIGESTIBLE NUTRIENTS.				Total Digestible Nutrients.	Nutritive Ratio.
		Crude Protein.	Fat.	Carbohydrates.	Fibre.		
Bulk Ration—	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	
25 lb. Maize Ensilage ..	7·5	0·25	0·07	2·67	1·30		
10 lb. Lucerne Chaff ..	9·2	1·55	0·07	2·77	0·84		
3 lb. Bran	2·6	0·37	0·05	1·21	0·10		
1·5 lb. Linseed Meal ..	1·3	0·33	0·11	0·47	0·06		
16·6 lb. Mixed Concentrate	14·6	1·50	0·52	8·20	0·37		
	35·2	4·00	0·82	15·32	2·67	22·8	1 ÷ 4·9
Allowing 10 lb. Green Lucerne for one hour's grazing ..	2·4	0·32	0·04	0·63	0·29		
	37·6	4·32	0·86	15·95	2·96	24·0	1 ÷ 4·8
Or Allowing 20 lb. Green Lucerne for two hours' grazing ..	4·8	0·64	0·08	1·26	0·58		
	40·0	4·64	0·90	16·58	3·25	25·4	1 ÷ 4·7

It will be seen that the digestible crude protein, 4.32 lb., agrees with that required by the standard, and that the amount of total digestible nutrients of this ration is somewhat lower.

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HEENZO should be used in every home

The Business End of a Cow

THE Udder of a Cow may be likened to a Business—it is profitable or otherwise. Most Farmers these days realise the advantages of weeding out the stragglers and stocking up with cows whose Udders represent a profit. But there is more to it—The Best Cow in the World is of little use unless all of its Butterfat is taken from the Milk with a good SEPARATOR. The moral is obvious – stock up with cows with a well developed "Business End", and seek the co-operation of the —

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MAMMITIS.

Under this heading may be included all derangements of the udder which are accompanied by inflammatory changes. Of all the domesticated animals the cow suffers most from this complaint, due to the extraordinary development of the mammary glands, as compared with those of the original type. Increased secretory power is accompanied by increased blood supply, and glandular tissue, but a decreased resistance to disease.

Mammitis may be divided into two broad classes—(1) Simple, (2) specific. In the first class would be included all those forms in which the primary cause is mechanical, such as injuries, cold, insect stings, overstocking, irregular or improper milking. In these cases the onset of the disease is ushered in with local inflammation in the area affected. This may be a portion or the whole of a quarter, or even one or more quarters may be involved. Should the affected area be extensive, there will also be constitutional changes, such as rise in temperature and loss of appetite. The local inflammation induces congestion with the accompanying symptoms of heat, pain, hardness, and cessation of normal milk secretion. The secretion from the congested area is watery and acid in reaction. This acid fluid, coming in contact with the normal milk in the teat duct, causes it to curdle, and the milk from that quarter will contain clots of curdled milk. Should proper attention be given to the case at this stage, the disease is arrested, and recovery quickly follows. First give a good active purgative, such as 12 to 16 oz. Epsom salts, mixed with a quart of warm water. To this mixture add a cup of treacle, and a dessertspoonful of ground ginger, and give as a drench. Local treatment consists of hot foments to the part, and frequent milking. Fomentations to be of value must be long continued—at least two hours once or twice daily.

If treatment has been omitted at this stage, pus-forming organisms invade the inflamed area, gaining an entrance through the milk ducts. The affected area is now an ideal breeding-place and they multiply very rapidly. Fluids drawn off at this stage will contain pus (matter) in addition to the curdled milk.

In the blood stream are certain cells called phagocytes whose function is to destroy invading bacteria. These phagocytes collect in and around the affected area. If they are not sufficiently numerous to destroy the bacteria, they cluster in the surrounding tissue and prevent the spread of the invading organisms. But during this time the toxins produced by the bacteria have caused a breaking down of the cellular tissue, which when mixed with the toxins has a debilitating action on the organisms which lowers their vitality. To further neutralise the action of the bacteria certain substances known as opsonins or antibodies appear in the blood stream and collect around the affected area and eventually destroy the invaders. The organisms having been destroyed, the temperature of the part is reduced, but the presence of the pus produced by their activity still remains and acts as a mild irritant. Should it be small in quantity it is absorbed into the system, but where the accumulation is considerable an abscess is formed.

Should the seat of the abscess be deeply surrounded by tissue, the fluid portions are absorbed and a fibrous capsule develops around the remainder. Should the abscess be near the surface, an external opening is formed and the contents evacuated and the broken down tissue is replaced by non-secreting tissue. Occasionally the abscess breaks into a milk duct and the pus can be drawn through the opening in the teat.

During what may be termed the secondary stage of the disease, that succeeding bacterial invasion—hot fomentation is of pronounced value, as it assists in reducing temperature by relaxing the tissues, and also induces a freer blood supply to the part. Should pain be severe, apply a mixture of equal parts of Belladonna liniment and soap liniment. Should the weight of the organ cause distress, support it by a broad bandage about 2 feet wide, in which four holes have been made for the teats. Place the teats in the holes, and pass the ends over the loins tying sufficiently tightly to support the weight of the udder.

In the second class called contagious mammitis in which the invasion of specific organisms is the primary factory, there are no constitutional symptoms, and very little local inflammation. The first indication of the presence of the disease is the decrease of normal milk in a quarter or quarters, and the presence of a brownish watery fluid. Rarely is there any curdling of the milk or pus in the milk. As the disease progresses, the quarter shrinks and becomes hard and fibrous and eventually dries up.

In this disease treatment consists of irrigation of the affected area with mild antiseptic solutions by gravitation. Take a small glass funnel, and about 7 feet of small rubber tubing. Fit one end of the tube to the funnel and to the other end attach a small milk tube. After careful sterilisation, insert the milk tube into the teat, using care not to injure the lining of the duct. Then holding the funnel about the level of the cow's back pour the fluid into it. In the funnel should be a loose pad and sterilised cotton wool to act as a strainer. After the quarter has been distended to its full capacity, remove the milk tube. Massage the quarter carefully and then draw the fluid off by ordinary milking. Repeat this treatment daily.

Care must be exercised in the selection of the disinfectant for injection as those which are acid in reaction, or have a tendency to coagulate albumen are unsuitable. Normal salt solution made by dissolving one teaspoonful of table salt to the pint of boiled water is of value or boracic acid 3 per cent. solution.

Treatment consists of introducing into the system of the patient a vaccine prepared from the various organisms which produce the disease. It is easily applied, acts quickly, is not expensive, and proves very satisfactory in cases of recent development. It is injected with an ordinary hypodermic syringe beneath the skin, usually behind the shoulder. It is supplied in small bottles containing 2 doses of 2 c.c. each, the second of which is injected about forty-eight hours after the first. In cases of recent origin two doses are usually sufficient to effect a cure. Treatment is obtainable through this Department, or direct from the Stock Experimental Station, Yeerongpilly.

In dealing with contagious mammitis, the infectious nature of the disease must be borne in mind. All affected animals should be removed from the herd, and, if possible, the person who treats them should not milk the healthy cows. As in small dairies this is not practicable, then these cows should be treated after milking is finished, and care should be taken to thoroughly cleanse the hands immediately after treatment. All fluids drawn from an affected cow should be collected in a vessel and then buried.

FOUNDING A DAIRY HERD.

When laying the foundation of a herd beginners with limited capital should buy females regardless of pedigree. Their selection should be made on the basis of type and production only, getting together animals which show prospect of really being seed stock. Often enough daughters of one sire can be secured, so that the operator's breeding programme can begin one generation ahead of the man who assembles on the basis of type and production alone. When finances are available and the animals can be found, we always recommend that they be line-bred and that all animals be members of the same family.

A Line-bred Sire.

The beginner should start with a herd bull that is the result of the best efforts of our master breeders—a bull that has required many generations of matings to produce. Just how nearly he will be able to do this will depend on his dairy cow sense and his pocket-book. The first sire should be line-bred. When an outcross sire is used and he makes an improvement in the herd it is usually due to the fact that one side of his pedigree contains much of the blood of one or two highly improved animals. In other words, this is undoubtedly the fact that makes him prepotent.

The easiest if not the best way for the breeder with a small heard to line breed is to select a sire from a herd that carries the blood on which he wishes to base his breeding operations.. The second sire should be out of a paternal sister. Official testing should be a regular part of the work in the herd from which the herd sire is secured, because records constitute a principal basis of selection. The dam of the bull selected should be better than the best cow in the herd where he is to be used, better in both type and production. With the beginner this usually is not hard to do.

The operator should periodically visit the herd where he bought the first sire, and each time make a careful study of the bull's paternal sisters and of the families in the herd, considered from the female side. An option should be secured on males out of two or three such paternal sisters. The offspring of the second sire in this case when bred on daughter of the first sire will have the sire of the first bull as their great grandsire on the top and also on the bottom of the pedigree.

If the man from whom the bulls were purchased was a constructive breeder there will be at least one other outstanding animal figuring on both sides of the pedigree. For example, the dam of the first bull may be a full or a half sister to the dam of the second bull—a fine condition to obtain, provided the animals are exceptionally good. When the second herd sire is secured, it is too soon to tell what the characteristic defect or defects of the daughters of the first sire are going to be. Such defects or lack of ability to "come through" must be expected. We have never seen the get of a bull which did not have them. The third bull should come from the same family, but have as his immediate ancestors animals in which there is not in evidence the outstanding defects of the females to which he is to be bred.

Selection must always play a leading role. An animal may have an ideal pedigree, but if he is lacking in type or his dam has an ill shaped udder, or she has badly winged shoulders or the like, the pedigree must be ignored. There must be a balance, and all things considered, the sire with the line-bred pedigree has the best chance of coming through.

The Sire.

The herd sire is half the herd. The dam of the herd sire is half of him, so the chances are that he will transmit as much from her as he does from his sire. No one man can do it all. He must depend on the breeder from whom he buys to have given similar considerations when he purchased or bred his sires. That is why we said that there is no other sensible conclusion than that we avail ourselves of the best of the best breeder's art. You, however, must be the man who decides which cow will be the dam of your herd sire. She should at least be a cow that even the most casual observer would turn to take a second look at.—"The Guernsey Breeders' Journal."

HOW OLD IS THE COW?

When a cow is over five years old her age can only be roughly guessed from the condition of the teeth (incisors) and the rings on the horns. But in the case of polled and dishorned stock there is only the teeth and the general appearance of the animals to indicate the age. A horned cow will be found to have a ring on her horns representing the birth of a calf yearly, and two years must generally be added to the number of rings because heifers are generally from two to two and a-half or three years old at the birth of their first calf. Thus a cow with four rings on her horns may be reckoned as six or seven years old.

But the condition of the teeth in reality determines the potential life service of the cow. The cow's molars may or may not be quite serviceable, but if her incisors are worn short, or broken, she may be accepted as ageing. Some cows have really good teeth at ten and twelve years old, but usually the teeth begin to shows signs of wear at six or seven years old. It depends a great deal upon the character of the soil, the crops, and the general feeding of the cows. On short, closely-gnawed pastures, especially on stony ground, the teeth of grazing cows wear fast. Fed on whole turnips, in a stone or concrete trough, having a rough, uneven bottom, the cow's teeth wear down faster than when she is fed on sliced turnips. The feeding of treacle and soft mashes hastens the decay of the teeth. The quality of the drinking water also affects the wearing qualities of the teeth.

Only the best milkers are, of course, retained till their teeth wear short. Occasionally a superior milch cow will be found with but a few rusty stumps where white ivories once were. Many an aged cow is reluctantly parted with, if she has been both superior at the pail and at the production of young stock. Many a good cow will well maintain her milk yield beyond twelve years old, but as a general rule cows are at their best after the birth of their third or fourth calf, say five or six years old, and when they arrive at the age of nine years their milk yield generally falls off gradually. Indifferent milkers are generally got rid of before they are five years old. Thus, if a buyer is in quest of a good cow at a market he is generally quite safe to buy a cow over six years, provided she is healthy, correct in the teats, and has fairly good teeth. But don't pay a stiff price for a cow that is past per prime.—The "Livestock Journal" (England).

POULTRY FOR THE FRUITGROWER.

BY P. RUMBALL, Poultry Expert.

THE combination of fruitgrowing and poultry-raising presents several features of economic importance. Fowls in the orchard obtain a good deal of natural food and help to maintain the orchard in good condition, thereby reducing the cost of production of both the fruit and the egg.

The advantages of the combination may be set down as follows:—

(1) Keeping down weeds.
(2) Keeping down many insect pests.
(3) The manurial value of poultry ranging in an orchard.
(4) Additional financial returns.

From the illustrations used in this the absence of weed growth will be noticed. This is not due to intense cultivation that is generally necessary, but to the presence of poultry. The owners of the farms where these photos. were taken assured the writer that before they kept fowls they were constantly cultivating and that now cultivation was only practised to loosen up the soil for the conservation of moisture. The keeping in check of weed growth means a good deal to the orchardist, while to the fowls it serves as an article of diet which is highly necessary for the maintenance of good health.

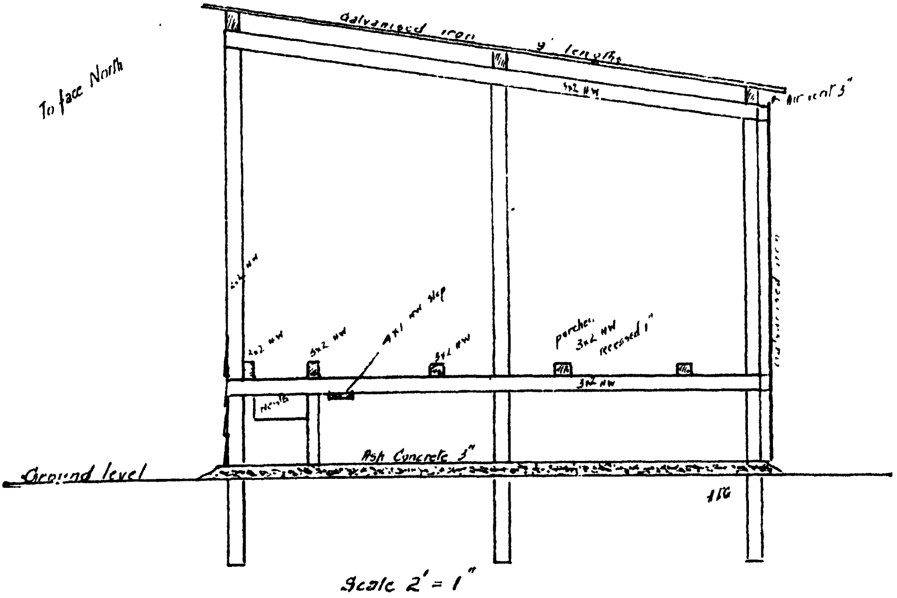


FIG. 1.

nsect Pests.

The fruitgrower knows probably better than the writer, the large numbers of insect pests which are detrimental to his industry, and that many of them, such as pupæ of the fruit fly, &c., hibernate in the soil. These are not safe from poultry owing to their partiality to insect life and their foraging nature. Caterpillars, grasshoppers, crickets, and beetles of many descriptions, which cause damage to fruit trees, fall easy victims to poultry, while the fowls' habits of dust bathing themselves in the shade of the trees, tends to keep the soil loose and prevents the undue growth of surface roots.

Manurial Value.

Possibly the greatest advantage in keeping fowls in conjunction with fruitgrowing is that of the manure distributed throughout the orchard. The grower knows what it costs to manure per acre or what it should cost, but he does not recognise the value of fowl manure. The quantity voided varies to some extent with different types of fowls and the method of feeding.

From a report published in the Journal of the Ministry of Agriculture of Great Britain of data collected at the College Poultry Farm, Theale, Reading, the following figures are taken:—

QUANTITIES VOIDED BY DIFFERENT BIRDS.

Kind of Fowl.	Weight.		Manure Voided Weekly.		Percentage of Body Weight.	Manure Voided per Bird per Annum (Fresh).	Number of Birds to Void One Ton per Annum (Fresh).
	Lb.	oz.	Lb.	oz.		Lb.	
Wyandotte cock ..	6	12	1	13	26·8	91¼	24
Faverolle hen ..	5	12	1	11¼	29·6	88½	25
Growing chicken, 14 weeks	3	12	1	2½	30·8	..	..

The breeds principally used for egg production in Queensland are not shown, but it will be seen that the laying hen and the growing chicken void a greater percentage than an adult male bird, and with high-producing birds, such as the Leghorn and Orpington, a conservative estimate would be 30 per cent. of live weight; therefore, a 4-lb. Leghorn would void per annum 62½ lb. and a 5-lb. Orpington 78, while it would take thirty-seven Leghorns or twenty-nine Orpingtons to void a ton.

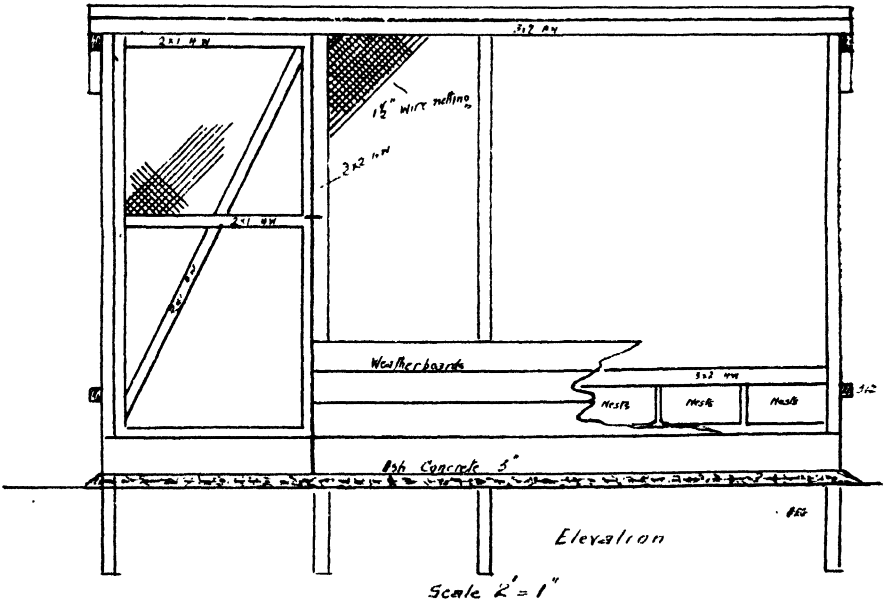


FIG. 2.

Composition of Fresh Poultry Manure.

The analysis of poultry manure varies with feeding, but that from stock fed on lines usually adopted for the maximum production should comply very closely to the following:—

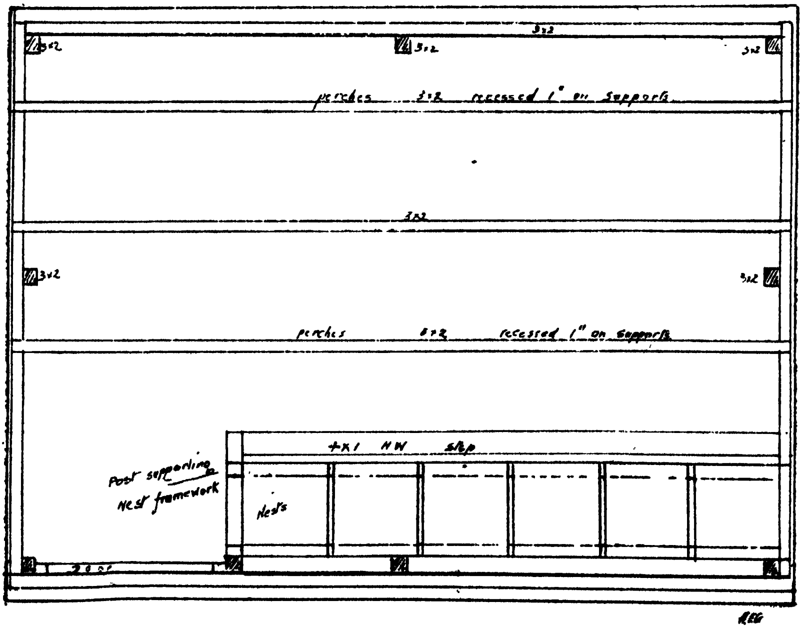
Moisture.	Dry matter.	Nitrogen.	Phosphoric acid.	Potash.
59.50	40.50	1.47	.71	.49

The commercial value of this manure based on its unit value is 39s. 6d. per ton, and the running of 200 fowls or slightly less, per acre, would be the means of manuring the land to the value of £10. However, its principal property being nitrogen some will be lost owing to its volatile nature, but there is in addition to the principal concentrates the organic matter—material which is an improvement to all soils.

Additional financial returns will depend largely upon the class of stock kept and the attention bestowed on them. Although they will save the grower many days labour in cultivation, spraying, &c., they will demand daily attention, and to the producer who is not inclined to give them this attention they are not recommended. Only the best should be kept. The breeding, rearing, and feeding should receive the same attention as the poultry farmer devotes to this work, as it is only by these means that the maximum results will be obtained. Generally speaking, each hen should return a profit over cost of feed, when kept in the vicinity of Brisbane, of about 10s., and 150 to 200 could be run per acre. This in conjunction with the manurial value should prove an incentive to fruitgrowers to work along these lines.

Making a Start.

Although the foregoing may appear attractive, in making a start, caution should be observed. The work of keeping poultry has to be fitted in and the great majority have to gain the experience essential for the rearing of young stock and the feeding of layers. A start should be made by the erection of a poultry house on the lines outlined in the plan, Figs. 1, 2, and 3. This house can be used with the addition of a cold brooder similar to that in Fig. 4 as a brooder house. After the brooding stage it can be used as a rearing house, and ultimately serve its original purpose of housing the adult laying stock. The rearing of chickens in quarters used for adult stock is not usually recommended, but under the conditions of range in the orchard soil contamination does not take place to any great extent.


3×2
3×2
3×2
3×2
perches 3×2 recessed 1" on supports
3×2
3×2
3×2
perches 3×2 recessed 1" on supports
4×1 HW slip
Post supporting nest framework
Nests
Door
REG

Ground Plan.

Scale 2' = 1"

FIG. 3.

The purchase of day-old chickens should then be made from some reputable breeder and so save the necessity of buying breeding stock, and the work entailed in incubation. By doing this the number of chickens you have for a start are definite, they will be of the same age, which facilitates rearing and prevents the period of chicken rearing being unduly prolonged and becoming irksome. In making the purchase be sure and go to a reputable breeder who maintains the qualities, of both numbers and size of eggs in his stock.

Possible the best months for securing chickens is during August and September. Earlier chickens can be made use of if it is desired to have two lots during the one season, and so allow the first lot to get off your hands before a second lot is commenced with, say, in September.

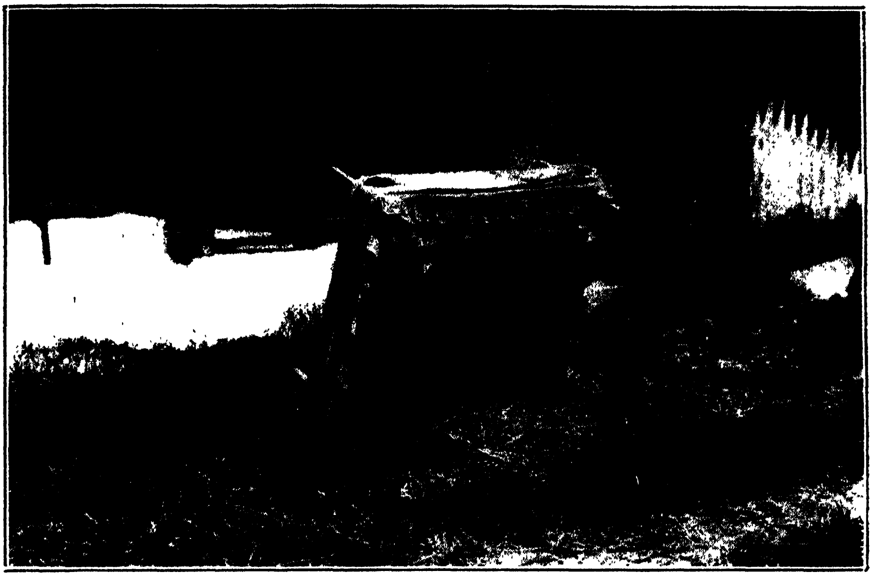


Plate 225 (Fig. 4).—The Multiple Brooder.

Plate 226 (Fig. 5).—Papaws and Poultry.

The luxuriant growth here seen is undoubtedly due to the value of the poultry manure. The soil is of a light loamy nature, and not naturally rich in plant food.

PLATE 227 (Fig. 6).—CUSTARD APPLES AND POULTRY.
This class of fruit tree offers a maximum amount of shade to poultry in summer.

PLATE 228 (Fig. 7).

Citrus fruit growing and poultry keeping is commonly practised in various localities. The benefits to this particular farmer of the combination have been less work and greater returns.

Netting partitions to keep various ages separate can be erected at convenient spaces if desired, but they would interfere with the cultivation of the orchard and are not absolutely essential. If chickens are reared in a special house and confined for the space of two or three weeks with a temporary fence they will invariably return to their own quarters to camp. Larger houses than shown in the plan may be built, but units of fifty placed at intervals about the orchard will ensure a better distribution of the birds' droppings and incidentally will cause the birds to forage over the whole of the orchard.

The system of feeding which is adopted may be either wet mash in the morning and grain at night or dry mash in hoppers which is before the birds all day and grain at night. The latter system especially to the novice and to the grower who desired to reduce his work is recommended. The birds by this means are assured of getting all the food they require for egg production, while the grower is relieved of a good deal of work daily.

Reference to the plan, Figs. 1, 2, and 3, plainly indicate the simple nature of the house suggested for the purpose of housing fifty laying hens. It is simple in structure, being open fronted, roofed, and walled at back and ends with corrugated iron. A 3-inch open space is provided between the top of the back wall and roof to permit of a good circulation of air. In front weather boards are used as a shield to the nests, the balance being netted in to allow of the stock being protected from predatory animals during the night. The nests are made from petrol tins, one side of which, with the exception of 1½ inch, is removed. This is then turned at right angles to prevent the tin falling through the nest frame-work. Three perches are shown, 3 by 2 hardwood being used. This is placed on edge and the top corners slightly champered. They are supported on the bottom batten, and by being recessed in to the depth of 1 inch are perfectly firm, at the same time are easily removed for cleaning purposes.

The floor is raised to the extent of 3 inches above ground level to ensure dryness. Concrete is recommended, being readily cleaned and it does not become saturated with droppings. Earthen floors become foul and require renewal at frequent intervals.

The lines suggested on which a start should be made are economical as regards permanent fixtures and equipment, and also relieve the producer for the time being of establishing breeding pens, the necessity of purchasing incubators, and becoming acquainted with the operations of an incubator.

EFFECTS OF INTER-CULTIVATION.

During a farmer's whole lifetime he is constantly at war with weeds, and he cannot hope to receive the full reward of his labour if that warfare ceases, or is spasmodic. To completely eradicate weeds seems to be an impossibility, but at least they can be so held in check that they will not appreciably injure the growth of cultivated farm crops.

Weeds cause much injury in several directions. They rob the desired plants of much of their food supply, resulting in a reduction of their yield, and necessitating an increase of the quantity of fertilisers applied. It has been computed that some annual weeds take more potash and lime from the soil than two good wheat crops. Weeds rob the desired crop of a great deal of moisture, which they evaporate from their leaves; and this robbing the soil of moisture is one of the most serious effects that weeds have on cultivated plants. The secret of keeping weeds in check is to destroy them as soon as they appear, and keep on doing it. If they are allowed to develop seed, the evil is increased a thousand-fold.

Persistent inter-cultivation increases air supply in the soil, which results in a stimulation of the beneficial soil bacteria. Such cultivation also assists in destroying certain soil acids that are injurious to cultivated plants. It also increases the supply of nitrates in the soil. When the surface soil among growing crops is not stirred, the air in it becomes impure through the presence of too much carbonic acid; but cultivation has the effect of dispersing a great deal of the carbonic acid, its place being taken by oxygen, without which no farm plants can thrive. Cultivation—deep or shallow, as the circumstances demand—is the master key which enables the farmer to unlock Nature's stores of fertility and obtain the highest possible results from the fertilisers he may apply.

To quote an old writer on agriculture: "Men much wrong their corn in not giving their land sufficient workmanship; land in good tilth, in good heart, and sound, will cast out its very marrow."—Primrose McConnell in the "New Zealand Farmer."

THE FARM TRACTOR.

By E. T. BROWN.*

The modern carburetter is constructed of such high-class material and is subjected to so little strain that it requires the minimum of attention to maintain it in perfect working order. The controls, however, should be looked to frequently, since owing to the amount of vibration when the outfit is working on the land, there is always a tendency for them to work loose. In the case of a machine running on kerosene the carburetter is a rather more complicated piece of mechanism, but even so there is very little that can go wrong and cause trouble. The parts of the instrument that require the most frequent attention are the fuel filter, the air filter, the needle valve, the float, and the jet.

No matter what grade of kerosene or petrol be bought it always contains a certain amount of impurities. These consist of solid particles and drops of water. The presence of either of these in the carburetter will result in a stoppage of the fuel supply. With care, however, there is no reason why they should be permitted to enter the instrument. Special gauze-fitted funnels are sold for straining the fuel when it is being poured into the tank, but when petrol is the fuel used chamois leather will be found a more satisfactory filtering medium. On no account should the fuel ever be poured direct into the tank. By so doing one is asking for trouble. Every tractor is fitted with a filter between the tank and the carburetter, but, generally speaking, these are inadequate in size. A small filter means that the attendant must pay extra special attention to cleaning it. In many cases this is necessary three and four times a day. There are, however, a number of excellent filters on the market that can be bought and fitted to practically all makes of farm tractors.

A number of tractors are now fitted with an additional device for removing impurities. A narrow trough or sump is provided in the bottom of the fuel tank. The trough is sloped and at the lowest end a drain cock is fitted, this being below the level of the outlet pipe leading to the carburetter. The impurities are heavier than the fuel; hence they sink and collect in the trough. The drain cock should be opened before the day's work starts, since this allows time for the impurities to settle over night. The fuel that is drained off—only a very little is taken away on each occasion—need not be wasted. It can always be used for cleaning purposes.

A stoppage of the flow of fuel is sometimes caused by an accumulation of solid matter in the pipe leading to the carburetter. If the unions be disconnected the obstruction can usually be removed by blowing. Another cause of a stoppage in the fuel supply is what is known as an air-lock. This, as its name implies, is the presence of air in the fuel pipe. It is never experienced when the pipe is bent in the proper manner; therefore, if fitting a new pipe, see that it is curved in exactly the same way as the original one. An air-lock can generally be taken out by removing the filler cap on the tank if the fuel be pressure fed. This must, however, be done slowly, so as to reduce the pressure before it is finally taken off. Failing this the fuel will spurt out in a strong stream. In other cases blowing through the pipe will force out the air. Some tractor operators have a habit of sucking the fuel up through the pipe; this is bad, since neither kerosene nor petrol are wholesome.

Reference has been made before to the air filter; therefore, this part of the system calls for no further comment. The orifice in the jet as supplied by the makers is sufficiently large to allow of an adequate supply of fuel to the vaporiser. A too large jet opening will cause the mixture to be too rich, and, on the other hand, a too small jet will starve the engine. It is seldom necessary to tamper with the jet, excepting to clean it from time to time. If it ever be necessary to fit a new one this should be of the same size as the original. No matter how carefully the fuel be strained it is next to impossible to prevent some dirt or foreign matter reaching the carburetter. A minute speck of dirt may lodge in the jet opening and stop the flow of fuel. A key is provided in the tool kit for removing the jet. This should be cleaned by blowing alone. If an attempt be made to remove the obstruction by means of a piece of Bowden wire the jet opening may easily be increased, in which case the setting of the carburetter is destroyed.

Care should be taken to ascertain the level of the fuel in the float chamber. The correct level is three-sixteenths of an inch below the jet opening. Various makes of carburetter differ, but in the vast majority of cases the position of the float can be corrected quite easily. In some instances the adjustment is made by a special screw acting on the jet, raising it or lowering it according to whether the level is too low or too high.

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* In the "Farmer and Settler."

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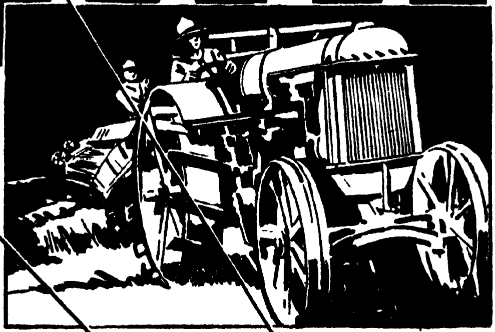

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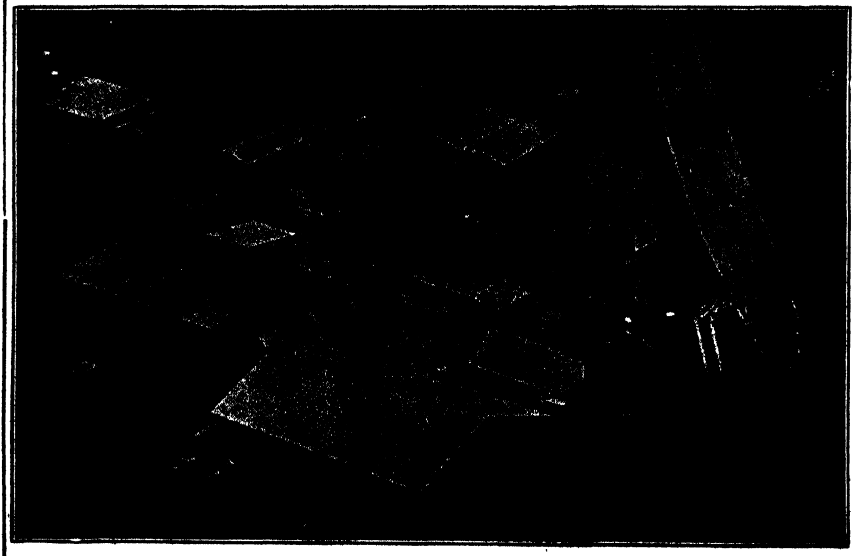

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REPAIR JOBS FOR THE FARM WORKSHOP.

The farm tractor operator frequently finds it necessary to use sheet metal of one kind or another when effecting repairs. Sheet metal of various gauges of iron, steel, and brass should be kept on hand. For making washers, clips, packing pieces, and the like they are indispensable. A necessary tool for cutting is a pair of stout metal-cutting shears. Metal, except temper steel, of any thickness up to three thirty-seconds of an inch can be cut with the shears. Heavier gauges of metal should be cut on an iron block or anvil with a cold chisel and heavy hammer. A guiding line should, of course, be made first with a steel scriber point, this being done on both sides of the sheet.

If very thick metal has to be cut it may be sawn in some cases; failing this, a row of small holes should be drilled close together along the cutting line. The metal between can then be cut with the chisel quite easily. The edges of the metal, whether cut by shears or chisel, should be trimmed by filing.

Using a Hacksaw.

Two kinds of blades should be bought for the ever-useful hacksaw. Some should have fine teeth; the others coarse. The former are employed for cutting iron and steel, together with brass tubes; the latter for softer metals, such as brass. Extreme care is necessary when using the hacksaw; otherwise a large number of blades will be broken. The blade must always be kept at right angles to the work and moved in a perfectly straight line. Hacksaw blades cut in one direction only. Pressure should, therefore, only be brought to bear on the blade when moving in the cutting direction, the direction depending, of course, on the way in which the blade has been fitted.

Dies and Taps.

Dies and taps are expensive tools, but the tractor owner is advised to purchase a set, especially if he be at some distance from the nearest stores. Otherwise they should be bought as required. British tractors are invariably fitted with nuts and bolts with what is known as the Whitworth thread. American tractors are fitted with special threads, these generally being 24 to the inch up to ⅜-inch bolts, with 20 threads to the inch for larger ones. Other machines make use of the millimetre sizes.

Dies and taps must be used carefully, especially the latter. Plenty of oil is needed when screwing iron or steel and the thread should only be cut in a clockwise direction. If there be a tendency to stick a half turn back should be made and then on again in the right direction, it is a mistake to turn violently in both directions, since this spoils the cutting edges. On no account should an attempt be made to screw or tap a hardened metal. It should be softened by heating before beginning operations.

The Art of Filing.

Filing is one of the most difficult jobs in the tractor garage to do in a proper manner. It is not nearly such an easy task as the majority of novices imagine. The handle of the file should be held in the right hand and the extreme tip by the fingers and thumb of the left hand. Filing should begin from the tip and proceed towards the handle. At the beginning of the stroke the greatest pressure should be applied at the tip and the least at the handle. As the stroke proceeds the pressure should be relieved gradually at the tip and increased at the handle end. At the middle of the stroke the pressure should be equal at each end; at the end of the stroke the bulk of the pressure should be at the handle end. On returning the file to its original position it should be lifted off the work.

The equipment of files should include flat, half-round, square, round, and three-cornered ones of medium and fine cut. A separate set of files should be kept for working with brass and other soft metals, since hard metals, such as iron and steel, soon take off the cutting edge. A file brush of steel wire should be part of the equipment. This is essential for keeping them in proper order.

Removing a Broken Stud.

This is a job that sometimes taxes the ingenuity of the tractor operator. He possesses no special tools for the purpose, and is at a loss to know how to proceed. If there be a part projecting this should be filed flat on two sides and gripped with a pair of pliers or with an adjustable spanner. An alternative to this is to make a cut across the top with a hacksaw so that it can be removed with a screwdriver. If neither of these plans can be adopted, owing to there not being sufficient of the stud projecting, a hole should be drilled vertically in the stud and the tang of a file inserted. The file can be gripped in a spanner and the stud unscrewed. If a considerable portion project the simplest plan is to screw on a nut and a locknut. By applying a spanner to the lower nut the stud can be unscrewed without any trouble. When inserting a new stud the same method can be followed, but in this case the top nut should be screwed down.

CARE OF THE CAR.

The outstanding advantage of the Duco finish to the motor-car is the ease with which it may be kept clean and "new." Duco is the hardest, toughest, and most durable finish developed, but if the owner desires to keep his car looking as it did when delivered to him, the finish must not be abused, and the following suggestions are offered to the purchaser of a Duco-finished car:—

The car should be cleaned at reasonable intervals. Although it is possible in some instances to clean with a dry cloth, it is usually best to wash the finish if the car is very dirty, particularly if grit or small sand particles be present. Should the finish, after washing, appear gray or white, thorough polishing is required and Duco Polish No. 7 is recommended for this purpose.

Care should be taken that no alcohol or mixture containing alcohol is spilled on the Duco finish, but if this does occur, it should be immediately wiped off.

The Duco finish will usually resist the action of dilute acids such as are present in battery solutions, but it is advisable to exercise care in keeping any acid, dilute or full strength, from the finish.

If the car be only dusty, the dust may be removed with a dry cloth, and the polish then applied. If the car be dirty, however, it should be washed and dried before the polish is applied. A dry, clean cloth should be used in rubbing off the polish, and with thorough rubbing a fine lustre will be obtained. If in cleaning and rubbing traces of the colour remain on the cloth, the owner need not be alarmed, as this represents a weathering or wearing action and does not appreciably affect the life of the finish.

As upholstery material in closed cars is exposed to dirt and weather conditions, it is desirable, at least once a month, or more frequently if necessary, to clean the upholstery with a vacuum cleaner and a stiff hand broom. If the material becomes spotted, a cleaning fluid may be used for removing the spots, and when this has thoroughly evaporated, a hot flat iron wrapped in a wet cloth applied. Steaming the fabric and rubbing lightly against the nap will raise the nap to its normal position. Floor carpets may be cleaned by rubbing with a sponge soaked in petrol.

Leather upholstery may be washed with pure soap and water, rinsing off the soap and drying with a moist chamois. Petrol should not be used on leather upholstery.

To remove dust or dirt on the outside of the top a sponge and soap suds might be used, rinsing with clear water and then drying with chamois. Petrol or oil of any kind should not be used, as these will injure the fabric and dull its lustre. When curtains are wet, they should be allowed to dry before being folded and put away.

The inside of closed model tops may be cleaned by brushing briskly with the nap, using a vacuum-cleaner if available.

AN INFORMATIVE JOURNAL.

A Downs farmer writes (10th November, 1929), appreciatively of

"The informative and instructive matter appearing monthly in the 'Queensland Agricultural Journal.' . . . It is very helpful to those farmers who wish to run their farms on intelligent and scientific lines."

Answers to Correspondents.

FRUITGROWING.

Selected from the outward correspondence of the Director of Fruit Culture, Mr. Geo. Williams:—

A Prolific Lemon Tree.

J.M.A. (Yalleroi) writes—

"Is 251 dozen lemons from one tree (Lisbon) in one season, anyway approaching a record? The lemons were picked between February and September, and were all well above the average-sized lemon bought in shops. Also, is the size of the tree unusual? The spread of the branches is, roughly, 18 feet in diameter. We have had continuous good crops from this particular tree, but this was a record for it. The tree is eighteen years old."

We cannot say that this production from one tree is a "record," but it is a very remarkable yield.

BOTANY.

The following answers have been selected from the outgoing mail of the Government Botanist, Mr. C. T. White, F.L.S.:—

Fodder Trees and Shrubs.

V.J.B. (Oakey)—

Some of the most useful fodder trees are—Portuguese Elm (*Celtis sinensis*), Bellasombre Tree (*Phytolacca dioica*), Kurrajong (*Sterculia diversifolia*), and Weeping Myall (*Acacia pendula*). We believe seeds of the Bellasombre Tree may be obtained from Mr. R. Dick, Purga, via Ipswich. The seeds of Kurrajong and Weeping Myall may be obtained from Messrs. A. Murphy and Sons, Woy Woy, New South Wales. The seeds of the Portuguese Elm are not available this season.

Twiggy Mullein.

E.T. (Maleny)—

Your specimen is known as the Twiggy Mullein (*Verbascum virgatum*). It is a stiff, erect growing plant of an annual duration; it is a native of the Mediterranean regions and Western Europe, and is now naturalised in Australia. It is a fairly common weed in Queensland but is not very aggressive. It has no particular value.

Prickly Poppy (*Argemone mexicana*).

A.J.C. (Yarraman, Brisbane Valley Line)—

Your specimen is the Prickly Poppy (*Argemone mexicana*). It is a weed, and sometimes a serious pest, and has been suspected at times of poisoning stock. It would be as well to eradicate it from your lucerne patch as it might become a harmful ingredient in hay cut from the cultivation in which it occurs.

Plants from the Eungella Range.

W.G.H. (Mackay)—

The specimen you send is *Crinum pedunculatum*. We have no data as to the regularity of the flowering of *Albizzia toona*. Some years ago when we visited the Eungella Range we saw one large tree of this species at the foot of the range. It was leafless at that time (October). Is this common to the species or do you think the tree we saw was exceptional in being deciduous?

Fertiliser Mixtures.

T.M. (The Summit, Southern Line)—

The Agricultural Chemist, Mr. J. C. Brünnich, advises as follows:—4–8–10 means that the mixed fertiliser contains 4 per cent. of nitrogen, 8 per cent. of phosphoric acid, and 10 per cent. of potash. See page 18 of pamphlet "Complete Fertilisers." There is very little gained by making your own mixtures, as all fertilisers are strictly charged for on the percentage of fertilising constituents they contain (page 53).

Plants Identified.

G.R. (Beechmont)—Your specimens are—

The little shrub with rather strongly-scented leaves and lavender flowers, *Prostanthera ovalifolia.*

The twining plant with blue flowers is *Comesperma volubile.*

The little shrub with yellowish flowers is *Pomaderris elliptica.* These Pomaderris shrubs are very handsome when in flower and a number of species occur in Queensland. We were very glad to see the specimens, as we intend to revise the Queensland species of the genus when we get enough material, as we think there are more than one species that go under the specific name of *elliptica.*

The Hop Bush is *Dodonæa megazyga.* We were also very glad to get this, as we only had specimens once before, collected by the late Mr. Schneider, from the Upper Nerang.

G.M. (Rabaul, Territory of New Guinea)—

1. *Flemingia strobolifera.* Family Leguminosæ. A shrub common in India, the Malayan Archipelago, and New Guinea. I was interested to hear of the value as food to stock.
2. Two specimens were included in this parcel; the larger was *Stachytarpheta dichotoma,* very common in Queensland and known here as Snake Weed. The smaller specimen was *Hyptis suaveolens,* a common tropical weed of the family Labiateæ. It is a native of tropical America and is now found in most tropical countries, including Queensland and New Guinea.
3. *Alysicarpus vaginalis* (syn. *A. nummaulariæfolius*).

A Text-book on Botany.

A.F.S. (North Isis)—

A book you might find useful is Mr. C. T. White's elementary text-book of Australian Forest Botany, published by the Government Printer, New South Wales, price 7s. 6d. This may be useful to you, as the examples quoted, illustrating various terms, are mostly Queensland species. Other Australian text-books are—one by Dende and Lucas, and another by Mrs. Brewster and Le Plastrier. Any bookseller could be able to supply you with them. The price is about 4s. or 5s. for each book.

Of text-books published outside Australia, one of the best is F. W. Oliver's Elementary Botany. The one used by the Queensland University is Lowson's text-book.

If you wish to get a knowledge of the local plants we should say a good plan would be for you to collect specimens and forward them here for identification.

Later, if you feel inclined, you could obtain a copy of the Queensland Flora, by the late F. M. Bailey, price 30s. a set of six volumes. This contains descriptions of all Queensland plants known up to the date of publication.

Plants Suspected of being Poisonous to Stock.

Some time ago we received some specimens suspected of poisoning a cow and heifer on a Toowoomba property. The specimens are—

1. *Jacaranda mimosæfolia.* The common jacaranda, native of South America, widely cultivated in Brisbane as a garden tree. It is not known to be poisonous in any way.
2. *Acacia* sp. Not specifically determinable without flowers or pods. The wattles or acacias are not generally regarded as poisonous except the pods of some species containing a saponin and regarded then as being poisonous, but no pods were borne on your specimens.
3. *Owenia acidula.* Emu Apple or Colane. A very handsome native tree common to the Downs; is not poisonous.
4. *Ligustrum lucidum,* the common species of privet, cultivated as an ornamental tree on the Downs. If the beasts were really poisoned, this may have been the cause of the trouble, as privets are generally regarded as poisonous, containing a bitter poison, glucoside. It is, however, a very common tree, cultivated everywhere on the Downs, and we have had no cases brought under our notice previously of stock eating it with fatal effect.

Analysis of "Native Pomegranate."

A.C.C. (Barcaldine)—

The parcel of creeping vines was handed to the Agricultural Chemist, Mr. J. C. Brünnich, whose analysis is as follows:—

Analysis of shrub *Capparis Mitchellii*, sometimes known as Native Pomegranate—Crude fat (on water-free material) = 3.0 per cent. Contains no appreciable amounts of essential oils and no motor spirit or oil.

Heart-Leaf Poison Bush.

"COREENA" (Barcaldine, C.Q.)—

We received your specimens of Heart-Leaf Poison Bush and regret to state that we are not in a position to be able to inform you definitely at what stage of the plant's growth it is not poisonous. A good deal has been said about this plant's being poisonous only at certain times, but up to the present we have no definite proof of the correctness of such statements.

The question of the poisonous character of this and many other plants is an exceedingly complex one. Mr. Brünnich, the Agricultural Chemist, has found an alkaloid in the Heart-Leaf Poison Bush, but so far the conditions which govern the appearance in the plant of this alkaloid are obscure. The botanical name of the Heart-Leaf Poison Bush is *Gastrolobium grandiflorum*.

The other specimen you sent, similar to Heart-Leaf Poison Bush, but with a long leaf which is silky on the under side, is *Grevillea Goodii*. This plant has been sent in here as a poison plant. There is a possibility, however, that it has been mistaken for the Heart-Leaf Poison Bush.

PIG RAISING.

(*Selected from the outward mail of the Senior Instructor in Pig Raising, Mr. E. J. Shelton, H.D.A.*)

Pig Feeding.

H.E.J. (Upper Caboolture)—

Apparently your pigs are suffering from a severe form of constipation and from lack of a regular and sufficient green food and clean drinking water. It is evident your system of feeding is at fault somewhere, and we believe the balancing up of concentrates with a sufficiency of green foods and drinking water will overcome the trouble.

Asphalt.

O.S.W. (Mondure)—The City Engineer, in answer to a similar query some time ago, favoured us with this reply:—

The term asphalt has a wide range, and is used to denote bitumen. Asphalt, which is composed of bitumen as a binder used to hold or cement the aggregate (particles of sand, stone, chips, &c.) together, and even when tar is used as a binder the resultant mixture is termed asphalt.

If the word tarpaving is substituted it makes the necessary distinction. I presume tarpaving is what is meant. If your correspondent is in a district where a stone crusher is at work and can get the run of crusher aggregate—i.e., material as it comes from the crusher—and separates sufficient material for his work that will pass through a three-eighth square mesh sieve, the desired grading will be obtained.

If, on the other hand, he has to make up the aggregate it will be necessary to procure 100 per cent. material passing a three-eighth square mesh, 30 per cent. of which shall be retained on one-eighth mesh, 15 per cent. on 20 mesh, and the balance of 45 per cent. will grade down to the finest sand or stone dust procurable to which 10 per cent. of tar shall be added. If the aggregate can be brought to within 10 or 15 per cent. of these figures a good mixture should result.

The tar should be poured into a flattened heap and raked over with a stiff rake till properly mixed. The tar should be boiled to the proper consistency or, better, distilled or prepared tar purchased.

The mixture will require from 18 to 23 gallons of tar per cubic yard of aggregate, depending upon the amount of fines contained therein. The finished surface should be dusted with dust or fine sand.

General Notes.

Staff Changes and Appointments.

The Officer in Charge of Police, Wondai, has been relieved of the appointment of Acting Inspector of Stock as from the 9th November, 1929.

The Officer in Charge of Police, Milmerran, has been appointed an Acting Inspector of Stock as from the 2nd November, 1929.

Constable M. Bourke, of Mount Molloy, has been appointed a Slaughtering Inspector as from the 19th October.

Mr. E. Rowlings, of Inglewood, has been appointed Government Representative on the Dingo Board for the Western Downs District, vice Mr. A. R. Charles, resigned.

Constable J. J. Codde, of Eulo, has been appointed a Slaughtering Inspector as from the 28th October, 1929.

Messrs. L. A. Dollery, G. Barber, and H. Holzapfel, of Cleveland, have been appointed Honorary Rangers under the Animals and Birds Acts.

The District Inspector of Stock, Rockhampton, has been reappointed Government Representative on the Gogango Dingo Board.

Mr. E. N. Goldsworthy, Superintendent of the Lazaret, Peel Island, has been appointed an Honorary Ranger under the Animals and Birds Acts as from the 2nd November, 1929.

Messrs. J. J. Tracey, R. Craig, and G. F. Moorhouse, of Currumbin, have been appointed Inspectors under the Diseases in Plants Acts as from the 2nd November, 1929.

Mr. L. F. Mandelson, of the Queensland University, has been appointed Assistant Pathologist, on probation, Department of Agriculture and Stock, as from 1st January, 1930.

Mr. P. J. McCauley, of Neurum Creek, has been appointed an officer under and for the purposes of the Animals and Birds Acts for the newly-proclaimed Sanctuary at Neurum Creek.

Messrs. A. C. P. Nurcombe, E. Widdup, D. F. Kay, P. J. Manuell, J. Byron, and W. J. White, of the Cotton Section, Department of Agriculture and Stock, have been appointed Assistant Graders (Senior) of the Cotton Section. Mr. W. A. R. Cowdry has been appointed Field Assistant, Cotton Section, as from 1st July, 1929.

Beware of Disease.

"Typhoid inoculation is no substitute for sanitary precautions, and the more highly civilised the community and the better use made of the knowledge of sanitation the less typhoid fever results.

"A warning note must again be sounded against the inactivity of rat prevention work and the ever present danger of plague visiting our shores. One match can start a conflagration, and one plague rat can start an epidemic."—From Annual Report of the Commissioner of Public Health.

Sugar-cane Growers' Defence Fund Levy.

A referendum to decide the question of the making of a levy for defence fund purposes by the Queensland Canegrowers' Council on all growers of sugar-cane, at the rate of 1d. per ton of sugar-cane harvested during the season ending on the 28th February, 1930, was conducted at the Department of Agriculture and Stock to-day with the following result:—

	Votes.
For the levy	1,914
Against the levy	1,591

This levy will be deducted by the managers of the respective sugar-mills from cane payments due by such mills to growers delivering their cane to such mills. The levy will be utilised in the following manner:—

Seventy-five per cent. for a defence fund to be used in assisting growers in cases of serious industrial trouble; in advertising; in compensation for injury caused by arson; and for other purposes such as legal expenses of vital importance to the sugar industry. The other 25 per cent. will be distributed amongst the various District Canegrowers' Executives to be utilised by them for local defence purposes.

Soil Surveys.

The Minister for Agriculture and Stock (Mr. H. F. Walker) has given notice in the Legislative Assembly that he would ask the House to consider the desirableness of introducing a Bill to authorise the entry of certain persons on to land for the purpose of making soil surveys of the State.

Foxes in Captivity—Penalty Imposed.

The Minister of Agriculture and Stock (Mr. H. F. Walker) has drawn attention to a practice which constitutes a distinct breach of a regulation under "*The Dingo and Marsupial Destruction Acts*, 1918-1923," for which a substantial penalty is provided. This refers to the keeping of foxes in captivity, and the insertion of newspaper advertisements to the effect that they are held for sale.

In view of the menace of the fox, particularly to the poultry industry, a bonus is offered by Dingo Boards for their destruction, and their capture for sale is therefore a matter which is viewed seriously by the Department of Agriculture and Stock, who will take the necessary action to deal with any further breaches of the regulation.

Mammitis—Departmental Service Appreciated.

Mr. J. W. Newbery, Clovelly, Kowguran, writes:—". . . Many dairy farmers suffer great loss through contagious mammitis, about the worst scourge that can befall his dairy herd. I was badly hit by this scourge two or three seasons ago, but stamped it out of my herd by inoculating all my cows—about 100 altogether—with an autogenous serum prepared from milk from affected cows in my herd by the Government Bacteriologist, Mr. C. J. Pound, and I would strongly advise any dairy farmer similarly afflicted to adopt this remedy. The Agricultural Department acts most generously in supplying the serum at a nominal cost, and the inoculating process is so simple that any farmer can do it if he takes ordinary precautions as to sterilisation and follows the instructions so clearly set out in the leaflet supplied with the serum."

Is this a Fact? A Point for Fruitgrowers.

A guest at a Canberra hotel, who recently asked to be supplied with Australian preserved fruit instead of imported fruit, has informed the Minister for Trade and Customs (Mr. Fenton) that he was told that the hotel stocked only foreigh preserved fruit. Mr. Fenton's informant added that it was rarely that Australian fruit was served in Australian hotels. Mr. Fenton, discussing the matter, said that it seemed extraordinary that in a country such as Australia, which grew some of the best fruit in the world, and where the preserving industry was so well advanced, the proprietors of hotels preferred to serve fruit brought from overseas. He would even be in favour of a boycott of the establishments which were so unpatriotic. If people would adopt a more Australian point of view there would be no difficulty in disposing of Australian preserved fruit. He could not understand the view taken by people who demanded the foreign product.

The Royal Society of Queensland.

The Ordinary Monthly Meeting of the Royal Society was held in the Geology Lecture Theatre of the University on Monday, 28th October. Professor J. P. Lowson, M.D., was in the chair, and about thirty members were present.

Miss D. Hill, B.Sc., read a paper entitled "The Stratigraphical Relationship of the Shales about Esk." The work indicated that the Esk Shales of the Ipswich coal measures represent closely related phases in a shallow fresh water basin, with but a slight chronological difference. For in effect the Basal Conglomerate of the Ipswich series changes laterally into the highest of the Esk series—the Esk shales. Both these are conformably underlaid by a volcanic stage. The Ipswich coal measure shales thin out rapidly northward and are missing from the basin north of Bellevue, where the overlying Bundamba comes to rest without apparent unconformity on the Esk Shales. The paper was discussed by Professor Richards, Drs. Bryan, Marks, and Whitehouse, and Messrs. Jones, Reid, and Tommerup.

Mr. Inigo Jones exhibited slides of the 1893 flood of the Brisbane River and maps of the area affected.

Dr. F. W. Whitehouse exhibited Bryozoa from the Lower Carboniferous limestones of Riverleigh, near Mundubbera. These included two species of *Archimedes* (genus new to Australia) and one of *Evactinopora* (genus new to E. Australia). The limestone with *Archimedes* contains the *Amygdalophyllum* coral fauna. The *Evactinopora* limestone is probably somewhat higher in the section.

Salt for Pigs—Warning against an Excessive Supply.

A warning against allowing pigs access to unlimited quantities of salt was given a few days ago by the Stock Inspector for the Casino district (N.S.W.), Mr. L. W. Devlin, who stated that he was called in recently to inspect a sow that subsequently died. Mr. Devlin found that a pig skin that had been salted in the process of tanning had been stretched over a log in the pig yard, and the sow had licked off a large quantity of salt, thus causing her death.

Southern Agents—A Business Hint to Fruitgrowers.

The Department of Agriculture, New South Wales, advises that instances have recently come before its notice in which Queensland fruitgrowers have consigned fruit for disposal in New South Wales, and have subsequently had difficulty in receiving the proceeds due to them.

Before consigning fruit to New South Wales agents, growers may, by communicating with the Registrar of Farm Produce Agents at Sydney, obtain information as to whether such agents are licensed under the Farm Produce Agents Act.

Hail Insurance Fund.

An amendment has been made to the Hail Insurance Reserve Fund and Hail Insurance Scheme Regulations under the Wheat Pool Acts. The object of these alterations is that the maximum of the reserve fund provided for in the original regulations which were passed in July, 1926, be increased from £10,000 to £20,000. In the old regulations it was provided that every grower should carry his own hail risk to the extent of the first 10 per cent. of the crop on the area damaged. This regulation has now been amended to read that every grower shall carry his own hail risk to the extent of the first 5 per cent. of the crop on the area damaged on each individual plot.

Provision is made to give wheatgrowers the opportunity of demanding a poll as to whether or not either or both of the above amendments shall be carried. In that connection a petition signed by at least 200 growers of wheat who delivered wheat to the Board for the 1927-28 or 1928-29 seasons must reach the Minister on or before the 17th December, 1929.

Fruit Drink Standards—Analyst's Comments.

The following excerpt from the Annual Report of the Government Analyst, Mr. J. B. Henderson, will interest citrus growers particularly:—

Of twelve samples of orange cordials examined, seven passed the fruit cordial standard, which requires the presence of not less than 20 per cent. of fruit juice. The aerated orange beverages on the market contained from nil to 10 per cent. of orange juice. The orange drink stalls were found to be dispensing a beverage containing about 10 per cent. of orange juice. The present popular demand for pure fruit drinks is one of the most beneficial national dietetic advances of recent years. Our most important fruits from the standpoint of vitamins are tomatoes, lemons, oranges, and bananas. Every one of these fruits contains at least four vitamins—namely, A, B, C, and D. These vitamins are the antirachitic, growth, antiscorbutic, and antineuritic "factors." It is important from the aspect of national health and the interests of our orchardists that the use of pure fruit drinks should be fostered in every possible way. A regulation appears to be necessary stipulating for a minimum proportion of, say, 5 per cent. of orange juice in orange beverages and the elimination of preservative and artificial colouring from all drinks sold over the counter for immediate consumption and purporting to be made on the premises from fresh fruit juice.

Other Points from the Analyst's Report—A Fat Reducer at about £5 a Pint.

Of twenty-two samples of minced meat and sausages examined thirteen samples failed to meet the standard in regard to preservative, the excess of sulphur dioxide in the sausages ranging from 2 to 243 per cent. Preservative is now forbidden in minced meat.

Three samples of chewing gum contained drugs in the form of acetylsalicylic acid and phenolphthalein. This method of administering drugs is undoubtedly dangerous.

A sample of soap, sold at a fabulous price, and described as flesh reducing, was found to be ordinary toilet soap adulterated with talc. A liquid preparation for reducing adipose tissue consisted of alcohol, soap, and camphor. The selling price of this simple mixture worked out at nearly £5 per pint.

Animals and Birds Sanctuary at Neurum Creek.

An Order in Council has been issued under the Animals and Birds Acts declaring that the Camping and Water Reserve 169, parish of Durundur, and an area of one-quarter of a mile on each side of that portion of Neurum Creek situated in the reserve and in portion 4, parish of Byron, shall be a sanctuary under the Animals and Birds Acts. This camping and water reserve is at Neurum Creek on the main Kilcoy-Woodford road, and is a favourite picnic spot.

Colour Standards for Tomatoes.

The Regulations under the Fruit and Vegetables Act have been added to by the making of provision for standards for the colour requirements for tomatoes. The amendment provides that the following colour definitions shall apply to this fruit:—

''Ripe'': To include tomatoes fully coloured;
''Coloured'': To include tomatoes showing colour but not fully coloured;
''Green'': To include tomatoes showing no colour but conforming to the prescribed maturity standards.

The object of the Regulations is to insure that all the tomatoes in each individual case shall be of a uniform degree of ripeness.

The Millaa Millaa District.

Mr. H. Mure Robertson, formerly Auditor-General, has been spending six weeks' holiday with his son at Millaa Millaa, and speaks highly of the potentialities of that district. ''During my twenty years' service as an audit inspector,'' he writes, ''I visited every town and district in this State many times, and I consider that in respect to climate, soil, permanent mountain streams, liberal rainfall, and natural advantages the Millaa Millaa district is unsurpassed in this State. The average altitude of 3,000 feet ensures a favourable climate with cool nights. Bartle Frere and Bellenden-Ker on the left and Father Clausey on the right attract a generous rainfall, with the result that this district always enjoys a bountiful supply of green feed and water for stock. As a tourist or health resort Millaa Millaa has many attractions—one could dwell indefinitely on the beauties of the district. At present tourists do not come further than Yungaburra, or Malanda, yet as regards scenery I think that the drive from Millaa Millaa to Ravenshoe over the range is equal to the famous drive over the coastal range from Yungaburra to Gordonvale. Although by rail the distance from Millaa Millaa to Innisfail is 155 miles, it is only about 30 miles in a direct line, and when the road now under construction is completed the Millaa Millaa district will then come into its own both as a dairying centre and as a tourist and health resort.''—''The Courier.''

Contamination of Cabbages—Dangers of Arsenate of Lead.

From the last Annual Report of the Government Analyst, Mr. J. B. Henderson:—In last year's annual report it was noted that arsenate of lead had been found in cabbages in dangerous proportion. The Food and Drug Regulations provide for no arsenic or lead in vegetables. A number of growers, particularly in one district, took no notice of the warnings given, and a number of consignments of cabbage contaminated with arsenate of lead have been seized in the markets and destroyed. Many of these cabbages contained comparatively high amounts of arsenate of lead, four containing between fifteen grains and seventeen grains of arsenate of lead. One on which the white stains of arsenate of lead were freely visible was boiled with salt and a little soda exactly as in an ordinary household. After straining it was found on analysis that the arsenate of lead as a result of the boiling had become evenly distributed throughout the cabbage and the water. The total arsenate of lead present was 15 grains. An ordinary helping of about 3 oz. of this cabbage would contain 0.25 grain of lead (calculated as metal) and 0.375 grain of arsenic (calculated as As_2O_5). Children are being advised at school to drink a cupful of cabbage water when they get the chance—probably for the vitamin content. A cupful (say 9 oz.) of water from this cabbage would contain 1.1 grain of lead (calculated as metal) and 0.6 grain of arsenic (calculated as As_2O_5), and the maximum medicinal dose of arsenic for an adult is only 0.06 grain. It is quite evident that there must have been cases of fairly acute poisoning from some of these cabbages. The symptoms of gastric and intestinal irritation in such cases occurring after a meal would not unlikely and not unnaturally be classed as ''ptomaine poisoning.'' There would also be a certainty of chronic lead poisoning if such contaminated cabbages were regularly used as a food. The drastic but necessary destruction of contaminated consignments will probably put an end to this highly dangerous practice.

Lead in Soda Water.

From the same report: Of 119 samples of soda water examined, sixty-nine samples contained lead at the rate of $\frac{1}{100}$th grain or more per gallon. While the proportion of lead has been markedly reduced since 1926-27, it is important from a health standpoint that soda water should be entirely free from such a toxic substance as lead. It would be interesting to know if the country that is supplying carbonators containing lead solder to Australia is also providing its own inhabitants with soda fountain drinks containing lead in solution. Queensland and Palestine are the only countries so far where we have seen the presence of lead in soda water reported.

Soil Biology—A Successful Research Worker.

Mr. E. C. Tommerup, B.Sc., A.A.C.I., Forest Assistant in the Queensland Forest Service, has been awarded the Commonwealth Research Scholarship in Soil Biology by the trustees of the Commonwealth Science and Industry Endowment Fund.

Mr. Tommerup joined the Queensland Forest Service in 1926, and completed a year's post graduate work in forestry subjects at the University of Queensland. He matriculated in 1922 from the Brisbane State High School. He secured his Degree in Science at the University of Queensland, majoring in zoology, chemistry, and geology. In 1923 he gained the Thomas Morrow prize for a thesis on the application of science to increase agricultural production.

He will commence his studies at the University of Sydney next January, at the completion of which he will proceed to the Rothamsted Experiment Station, in England. He will be absent from Australia for about two years.

Mr. Tommerup is the eldest son of Mr. H. G. Tommerup, of Brisbane and Beaudesert.

"There is no Finer Workman than the Australian."

"It is somebody's job to strike a note of optimism in Australia," declared Mr. S. McKay, chairman of directors of H. V. McKay Proprietary Limited, Sunshine, Victoria, on his return from overseas recently. "Other countries have their worries, but they do not proclaim them to the world as we do. Australia is certainly passing through a very difficult period, but she can make a good recovery. She has wonderful powers of recuperation. She has been suffering from dry conditions and general depression, but so have other countries. The experience in Australia, however, has shown that good seasons invariably follow bad." Mr. McKay said that Australia possessed the right quality of materials, her steel, leather, and timber, particularly if the last-named were properly seasoned, more than met the requirements for the manufacture of harvesters, as far as quality was concerned. Australian workmen were efficient, skilful, and hardworking, notwithstanding what some people had said to the contrary. "There is no finer workman than the Australian, and, moreover, he possesses initiative. I would not change my staff at Sunshine for any staff that I have seen in America," continued Mr. McKay. The fundamental difficulty is the higher cost of the materials.

Does the Pioneer Spirit Survive?

Who will deny that Queensland is the land of opportunities or that the pioneering spirit is dead? A letter to the "Brisbane Courier," from Mr. Mure H. Robertson, former Auditor-General of Queensland, who is spending a holiday with his son at Millaa Millaa, North Queensland, is an effective reply to the pessimists concerning the future of the State. Ample room, he declares, is available in the Palmerston district for new settlers, who will have before them the example of many pioneers of recent years. Recently Mr. Robertson visited the homes of a number of settlers, amongst whom were a man and his wife—both accomplished and most intelligent—who, twelve years ago, left Sydney and selected 160 acres of dense scrub land in the Far North. The husband had never before had an axe in his hand, yet he set about to clear just sufficient land to accommodate a tent, in the meantime sleeping in a neighbouring barn. Later, with sufficient clearance, he planted grass to enable a horse to be maintained. In the absence of road communication all supplies had to be carried to the selection by the man and his wife. With the help of aborigines the man cut or sawed all the timber required for the building of a house, and carried from the town all the galvanised iron necessary for a roof and a tank. By dint only of hard work the settler was able to clear all the land and acquire an additional 40 acres, which is now all under grass, supporting a sleek herd of milkers. The couple enjoy excellent health, and have no desire to return to city life. Such are the rewards of grit and hard work.

Dirty Milk and Cheesemaking.

Dirty milk is one cause of trouble in the butter or cheesemaking dairy. Dairy products of prime quality cannot be made if the milk utilised for them is unclean, because the species of germs that prevail in dirty milk always taint it. It is only the kinds bacteria that are present in clean milk that are of assistance in the manufacture of dairy products. As dirty milk is due to carelessness with the milking cans and other utensils and appliances, this can easily be avoided.

Girls in Industry.

"I think girls will be used more and more for routine work instead of boys; first because they are less susceptible to monotony than the latter, and next, because the so-called blind-alley job is less of a menace to them than to the boys," declared the Chief Railway Commissioner for New South Wales (Mr. W. J. Cleary), in a paper which he read before the Economic Society. He added that he was not afraid of the economic effect of the invasion of industry by girls, because the eventual effect of this would not be unemployment of men, but a stimulus to men to fit themselves by training for more important work. The result would be a considerable improvement in the standard and quantity of output.

Aviation in Queensland.

During October machines of the Queensland and Northern Territory Aerial Services Limited carried 242 persons, and freight weighing 2,929 lb., the miles flown being 19,180, making a total mileage since the inception of the service of 968,948. The report of the company states that passengers on the regular route are coming forward steadily, and a useful service is being provided. Passengers between Brisbane and Mount Isa are carried each month; three days' travel time being saved by using the air service. Amongst freights carried for the month were newspapers, fruit, ice, and butter, besides medicines, flowers, car batteries, tubes and tyres, groceries, books, photographs, toy balloons, a gramophone, serum, and dental goods.

To Protect Haystacks from Mice.

Replying to a correspondent who inquired as to the best method of protecting a hay shed from rats and mice, the Supervising Architect of the N.S.W. Department of Agriculture stated that a barrier of plain iron, fixed on the outside of a wood frame, let into the ground 9 to 12 inches and projecting about 2 feet 9 inches above it, would have the desired effect. Let into the ground as described (in order to prevent the vermin tunnelling underneath it), the barrier is more or less a fixture—that is, it could not be moved to permit vehicles being drawn into the shed except at great trouble. It was recommended, therefore, that gates—comprising merely a panel about 10 feet long and fixed in such a way that they can readily be moved—be made in the barrier where necessary, and that underneath these gates a concrete wall 3 inches thick and 9 inches deep be constructed, the top of this wall to be flush with the bottom of the gate—the whole of the wall, that is to say, being below ground level.

The barrier should be constructed so that only a plain iron surface appears on the outside; therefore attention must be given to the construction at the corners and gate posts. If corrugated iron is employed in lieu of plain iron, curved sheets should be used at the corners, otherwise it is difficult to make a mouse-proof junction.

Care of the Working Horse.

In most orchards the horse is the main source of power used for drawing the various types of cultural implements used, and in order that such power be at its best (this is quite apart from, but not more important than, the question of ordinary humanity) every care should be taken of the horse, which should never be neglected, as he plays a very important part in orchard economy. Proper and regular feeding, watering, grooming, and stabling should all be attended to, otherwise the animal cannot reasonably be expected to do a satisfactory day's work.

Occasionally some discomfort is caused the animal through want of thought. Some orchardists place a piece of hessian over the mouth of the horse during cultural operations to prevent his biting the trees as he passes along the rows. This hessian muzzle may prove very distressing to the animal, especially in hot weather, and the discomfort can be obviated or minimised by using coarse gauze or netting instead of hessian. The horse is then able to breathe more freely, even when labouring under a heavy load.

Attention should also be paid to the harness, which should fit neatly, and steps taken to prevent any rubbing that may result in painful sores. Special care should be taken in choosing a collar, as one that is too tight is very distressing, while one that is too large is apt to chafe.

Agricultural Organisation—Minister's Remarks.

Addressing a representative gathering of Lockyer farmers at the Queensland Agricultural College at Gatton on 18th November, the Minister of Agriculture and Stock (Mr. Harry F. Walker) expressed his pleasure at being afforded an opportunity of addressing the farmers of the district. He remembered the early days when, as a result of want of organisation, farmers had to accept low prices and work under adverse conditions. As a result of organisation they had moved along, and, backed up by the departmental experts and research work, there was nothing to prevent them, as a concentrated body of farmers, getting the best out of their industry. He was out to push the organised marketing and selling of their products. Fifteen industries were now controlled by the Commodity Boards that had done splendid work. He asked where would the butter industry be but for the Butter Board or the Paterson scheme? The excellent marketing of wheat, due to the efforts of the Wheat Board, was responsible for the increased areas grown. Speaking of the Agricultural Department, Mr. Walker said he thought farmers did not make use of the department in the way they should. Civilisation had brought many problems to the agriculturist, and the work of the Department of Agriculture was to assist the farmer to solve those problems.

Home Projects—Work in Gayndah District.

Recently the Director of Education (Mr. B. J. McKenna) attended the Home Projects Club day at the Gayndah Rural School, and he expressed high appreciation of the work which was being done by the club. Mr. McKenna was accompanied by the Assistant Chief Inspector of Schools (Mr. R. McL. Riddell).

Mr. McKenna said that they were met by the school committee and taken by motor-car to the homes of some of the pupils enrolled as club members. The object was to see at first hand the work being carried out in the homes. The arrangements made by the boys were exceedingly creditable, and the housing of poultry and pigs and other farm stock there was on the most approved lines. The ingenuity displayed by some in providing drinking troughs was a tribute to the work being done on the vocational side of the rural school's activity. The various displays at the school were next inspected, a feature being a cupboard project by the girls, which was made at a cost of 7s. 6d. Its contents included jams, preserves, and confectionery, as well as ordinary household requirements, such as bread, scones, and cakes.

Luncheon, cooked by the rural school domestic science section, was served to the visitors. The various exhibits were judged by experts in the different sections, and prizes awarded. The gathering was one of the largest seen in Gayndah. Interesting features were addresses by four boys who were undertaking projects work. Speeches were also delivered by Mr. R. L. Boyd, M.L.A., and departmental officers.

Mr. McKenna said that the club work was having an effect in the district in the way of introducing better breeds of animals and the latest methods of housing and feeding. At the same time, the training in civics was a valuable aid to the pupil.

A Simple Abortion Preventive.

Mr. A. Levie, county veterinary officer for Derbyshire, reviewing in the "Handbook of the East Devon Milk Recording Society" the information available with regard to contagious abortion, arrives at the conclusion that the predisposing cause of the disease is a shortage of the necessary amount of salts in the blood and tissues of the body, thereby weakening the body resistance to disease. Put this right, he says, and the cause is inoperative. In this he claims to be supported by the success of the following measures adopted at all centres. They consist of giving in the food crude carbolic acid, iodine, rock salt, ground limestone, and cod liver oil, as follows:—

For twenty-four cows take 24 drachms (3 oz.) of a mixture of crude carbolic acid and iodine. Put this quantity in 24 pints (3 gallons) of boiling water; mix thoroughly, then sprinkle this solution from a watering-can all over the food for one meal for twenty-four cows, and mix thoroughly by turning the food over three times. Then give each animal her portion of this medicated food. Do this twice a week.

Put a piece of rock salt in front of each animal to lick at pleasure; a tablespoonful of ground limestone and a tablespoonful of cod liver oil in each cow's food twice a week, but not on the days the carbolic mixture is given. The crude carbolic acid and iodine mixture consists of adding 1 drachm of iodine resublimed to 16 oz. crude carbolic acid.

It will be seen that an endeavour is thus made to supply the required mineral of the body and at the same time to stimulate the activity of the thyroid glands. This gland secretes thyroxin; it is an essential to life. Lacking it, the body cannot grow, and if already grown will degenerate and perish.

The Varying Feeding Value of Chaff.

The feeding value of wheaten chaff depends largely on the class of soil on which it is grown, a rich soil generally producing a chaff of high feeding value. At Coonamble Experiment Farm, New South Wales, it was observed that chaff from hay grown on the rich black soil required very little grain added to make it a sufficient ration for horses. Chaff produced on good soils has not always such an attractive appearance as that which comes from the lighter soils, but if the feeding qualities were better understood the former would be appreciated more highly. To convince the Sydney market that this is so will take time, no doubt, but meanwhile the farmer who has a strong soil can console himself that he can feed his horses well with less grain than if he were located on lighter land.

The Demand for Good Farm Horses.

We have frequently stressed the fact that, whatever may happen on the big farms and in the cities, there will always, in our time at least, be a demand for good draught horses. Even the tractor manufacturers are now admitting that fact. There was a period in the early history of power-farming when the most extravagant claims were made for the tractor. Now that it has worked its way into a more or less definite niche and has proved its value by means of experiment and trial its sponsors realise that, great as its utility is, it is not economically suitable for scores of the smaller jobs for which the horse is specially adapted.

The only factor that may lead to the ultimate displacement of the horse on the farm is the failure of breeders to keep up its standard. So long as sound, flat-boned types are bred, the type that can step out well and keep the plough, the cultivator, or the drill moving at a good pace without tiring on a reasonable day's work, the place of the draught horse is assured. Those who possess the right stamp of mares should not hesitate to breed from them, for they will find that the demand is there provided they can deliver "the goods."—The "New Zealand Farmer."

Downy Mildew in Vines.

Where attention has not yet been given to spraying for downy mildew, the operation should no longer be overlooked.

Downy mildew can be controlled by careful and systematic spraying with Bordeaux mixture, and no grower should neglect this excellent type of insurance for his crop. An endeavour should be made to keep a coating of the fungicide continuously on the vine to prevent infection taking place. The principal formula for Bordeaux mixture is as follows:—Bluestone (copper sulphate) 6 lb., lime (freshly burnt) 4 lb., water 40 or 50 gallons. Details of its preparation are the subject of a free departmental leaflet.

It is important to remember that Bordeaux mixture should be applied *before* the disease makes its appearance, in order to ensure adequate protection.

No hard-and-fast rule as to the time of spraying can be laid down. The outbreak of downy mildew is largely dependent upon prevailing weather conditions. In districts liable to black spot the Bordeaux spray (6—4—40) given when the early buds are bursting will also protect the vines for a short period against a very early attack of downy mildew. If the grower finds it unnecessary to take measures against black spot he should apply his first spray for downy mildew (Bordeaux mixture at 6—4—50 strength) when the shoots are about 9 inches long—not later. As new growth appears the vines should be resprayed—roughly at intervals of about two weeks. Generally speaking, downy mildew attacks vines later in the season than black spot, chiefly when the fruit is set. In some vineyards as many as six applications of spray are made. It is important that the Bordeaux should be freshly made when applied.

In abnormally bad seasons Bordeaux mixture made to a strength of 10—5—50 may prove an advantage.

Although sulphur is the recognised treatment for prevention of oidium or powdery mildew, systematic spraying with Bordeaux mixture will prevent this disease from becoming established.

In districts where good lime is hard to procure, washing soda can be substituted and Burgundy mixture made instead of Bordeaux. This spray is made according to the following formula:—Bluestone, 4 lb.; common washing soda, 6 lb.; water, 50 gallons. Burgundy mixture should be carefully made. It is important that it be applied *fresh*.

Burgundy mixture does not adhere to the foliage quite as well as Bordeaux; therefore, wherever possible, Bordeaux mixture should be used.

Milk Recording in England.

Volume 12 of the "Register of Dairy Cows" has been published by the Ministry of Agriculture and Fisheries (England). In 1917, the first year of the register, 478 members recorded 13,838 cows, of which 572 qualified for entry. Last year 4,862 members recorded 149,971 cows, of which 13,539 qualified. In the first volume the highest yield was 19,646 lb. milk; in the last it was 24,512 lb. milk. In eleven years the number of cows recorded has increased nearly elevenfold, while the percentage of cows that have qualified for the register has more than doubled. Not only has the progress of milk recording been phenomenal, but production has steadily increased, as a result of the lessons taught by the project. The standards for entry in the register vary for the different breeds, and are:—British Friesians (10,000 lb. milk), Shorthorns, Lincoln Reds, Ayrshires, Blue Albions, and Red Polls (9,000 lb. milk); Jerseys, Guernseys, Devons, South Devons, and Welsh (8,000 lb. milk). The milk yields of the leading cows of each breed are as follows:—Friesians (24,512¾ lb.), Shorthorn (22,868½ lb.), Blue Albion (22,533½ lb.), Devon (22,135 lb.), Lincoln Red (18,920½ lb.), Red Poll (17,965 lb.), Hereford (15,510 lb.), South Devon (15,378¾ lb.), Welsh Black (15,263½ lb.), Jersey (15,028 lb.), Guernsey (14,743½ lb.), Ayrshire (14,449 lb.), Kerry (13,053 lb.), Park (12,739¾ lb.), Gloucester (11,993½ lb.), Dexter 11,130¾ lb.), Aberdeen-Angus (10,802¾ lb.), Sussex (10,110¾ lb.), Longhorn (9,660¾ lb.), Galloway (9,305 lb.). The register is issued (1) to provide dairymen with lists of milk recorded cows with high yields, and of dairy bulls, particulars of which are available under the Ministry's milk recording project; (2) to encourage the keeping of authentic milk records, and the breeding of high-class dairy cattle; (3) to encourage dairymen to use pedigree bulls bred from a proven milking strain. The testing of pedigree herds by the Department of Agriculture of the various States of the Commonwealth has similar objects in view, and is proving equally efficacious.

Summer Fodders—Effect on Subsequent Wheat Yields.

Details of an experiment to determine the effect of summer fodder crops on the yields of subsequent wheat crops are given in a recent "Agricultural Gazette" of New South Wales.

In the Cumnock district, where farms are comparatively small and land values comparatively high, and where the rainfall is sound and above the average for wheat-growing districts, and climatic conditions are not severe, the soil could, in some opinions, be made to yield greater returns than those obtainable from wheat alternated with bare fallow in conjunction with sheep grazed on the stubbles and fallows. A fodder crop, it is contended, could safely and profitably be grown before the wheat. With the object of determining this question a departmental trial was commenced in 1925-26 in co-operation with Mrs. J. Berney, of Kildara, Eurimbla, in which certain areas were sown with summer fodders, grazed off, and followed by wheat, in order to ascertain the effect of the summer fodders on wheat yields in comparison with an area of bare fallow.

The total yields for the three seasons, 1926-28, were as follows:—

	Yield per acre.	
	bus.	lb.
Wheat after Japanese millet	53	55
Wheat after Sudan grass	60	13
Wheat on bare fallow	63	36

The aggregate yields for three years, it will be seen, showed a difference of 3¼ and 9¾ bushels in favour of bare fallow as compared with Sudan grass and Japanese millet respectively, which, at 5s. per bushel, represent monetary losses in wheat returns of 16s. 3d. and 48s. 9d. per acre. While the results of the trial extending over a period of three years show that the growing of summer fodders on a fallow prior to the sowing of the wheat or main profit crop has a retarding effect on subsequent wheat yields, states the Senior Agricultural Instructor who describes the trials, the amount of grazing or greenstuff for silage purposes which is obtained from the sowing of quick-growing summer fodders such as Sudan grass or Japanese millet in average seasons more than compensates landowners for the apparent monetary losses previously quoted, particularly in view of fluctuating wheat prices, and the greater attention being paid to the production of fat lambs, &c.

The question as to whether a system such as this would tend to encourage weed growth and the spread of diseases was not considered.

Colostrum—or "First Milk."

Colostrum, which is sometimes known as "First Milk" or "Beastings," is the milk secreted immediately preceding and directly after calving. It forms the best and only natural kind of nourishment for newly-born calves, and they should never be denied the "first milk," as it has a special action on the intestinal canals.

Colostrum has a yellowish colour, peculiar smell, and a slimy appearance. After a lapse of from three to five days it assumes the characters of normal milk. During the first few hours after calving colostrum is very rich in solids, and contains characteristic organisms known as colostrum corpuscles, which do not wholly disappear until three weeks after calving.

The percentage of milk sugar is very small, its place being taken by other sugars, while the fat content is extremely variable. Colostrum coagulates on heating, which is due to the high percentage of proteid matter and albumin. The heat test is a reliable one, if doubtful as to the fitness of milk for use in the dairy soon after calving.

The mineral ash in colostrum is present to a greater extent than in normal milk, while the specific gravity is also higher, and varies from 1.046 to 1.079. (Normal milk 1.032). The milk given by cows after calving should not be used for at least four days if for butter-making; or ten days if for making cream cheese. As the composition of colostrum varies so considerably, until it finally assumes the characters of ordinary milk, no two analyses read exactly the same.

Comparing the analyses of colostrum with the average analysis of normal milk, a large percentage of proteids is found. Although the fat content is sometimes more than that in the ordinary milk, yet this is not always the case, the percentage of fat being often similar. Continuing the comparison, average milk contains from 6.60 to 11.80 per cent. more water than colostrum, and less mineral ash.

To Remove Foreign Bodies from the Eye.

The commonest foreign bodies in the eye met with in our farm animals are small pieces of straw and chaff. They are light, easily carried and blown into the eyes by the wind, or by snorting or coughing when the animal is feeding.

The foreign body lodging on the surface of the eye (the cornea) sets up an intense irritation and extra secretion of tears. This copious flow of tears from the affected eye is a common primary symptom. If the eye is not attended to at this stage new inflammatory tissue is laid down, and the straw or chaff becomes covered and embedded in this new deposit. As the irritation continues, so does the deposition of this new tissue, until the whole of the surface of the eye is covered with a whitish, opaque film. This is known as opacity of the cornea.

Later, if this irritation does not subside, actual ulceration of the cornea occurs with the discharge of pus. The whole eyeball may now become involved, the pus spreading to the deeper structures and permanently ruining the sight. The eyeball at this stage may become a dirty discharging mass of proud flesh assuming a tumourlike growth.

Treatment.—Of the old time treatments none were so barbarous as the pluffing into the affected eye of ground glass, sugar or powdered alum. This cruel irrational practice, which caused great pain and suffering to the animal and often resulted in permanent injury, is now happily rarely practised.

The modern method is as follows:—A chaff or straw on the eye, if noticed in its earliest stages, can as a rule be easily removed. Take a piece of clean, soft rag, a handkerchief will answer the purpose, wrap this around the index finger so that about half an inch of the rag projects in a roll from the tip of the finger. A small quantity of vaseline or castor oil is smeared on the tip of the handkerchief. The animal's head is held in position, and at a suitable opportunity, with a bold stroke, the clothed fingertip is brought smartly across the eyeball over the chaff or straw. As a rule the offending particle will be found adhering to the handkerchief.

The after treatment consists of flushing the eye with a 2 per cent. solution of zinc sulphate, two or three times daily. The animal should be kept out of brilliant sunshine and away from draughts. Solutions of silver nitrate are also used with beneficial results. If the foreign body cannot be located continue flushing the eye with the solution, and in the majority of cases the white opaque film will disappear within the course of a few days.

When foreign bodies such as thorns have lodged in the depth of the eye, or in the case of valuable stock, it is best to seek the services of a qualified veterinarian.—"Practice" in the "New Zealand Farmer.".

Concrete on the Farm.

Mixing.—Concrete should be mixed on a wood, concrete, or other paved floor. If mixed on the ground, soil, grass, and other foreign matter is shovelled up with it and the concrete is weakened; the same result obtains if the mixer walks across the mixing floor with muddy boots.

The mixing floor should be reasonably water-tight, otherwise the liquid cement will escape and impoverish the concrete. Mixing should be done as near the work as possible to expedite the job, and also because wheeling concrete long distances in barrows causes the water and cement to rise to the top and the metal to settle hard in the bottom, necessitating a good deal of scraping out, particularly when the metal and sand are poorly graded.

The proportions of cement, sand, and metal vary according to the work in hand and, to a great extent, with the quality of the sand and metal. For foundations of a cottage, bases for engines, thick retaining walls and the like, use one part cement, three parts sand, and six parts metal of 1¼-inch gauge; for walls of a cottage, floors of sheds, verandahs, &c., one part cement, three parts sand, six parts metal of 1-inch gauge; for fence posts, fodder silos, water tanks, &c., one part cement, 2½ parts sand, and five of metal of ¾-inch gauge.

Gauge Boxes.—It is unwise and uneconomical to guess at the proportions. For small jobs the ubiquitous petrol or kerosene tin may be used for measuring the cement, sand, and metal. For large jobs, however, it pays to make wooden gauge boxes, which are not difficult to construct. Cement is now usually received in paper bags containing 1 cubic foot. A useful gauge box for a 1-2½-5 mix is 2 feet 6 inches wide, 4 feet long and 12 inches deep. This is filled with metal, and as the amount of sand used is half that of the metal the same gauge box can be used by half filling it with sand. This quantity of metal and sand will require exactly two bags of cement. For a 1-3-6 mix a useful size is 2 feet 8 inches wide, 4 feet 6 inches long, and 12 inches deep. This may be used for the sand by half filling it, and the batch will require two bags of cement.

The gauge box is placed at one end of the mixing floor, and filled with metal; it is then lifted off, and the metal spread out to a depth of about 6 inches. The gauge box is then placed on top of the metal and half filled with sand; it is again lifted off and the sand spread evenly over the metal. The required amount of cement is then emptied on to and evenly spread over the sand, and the whole is turned over with a shovel, not throwing it into a heap but rather spreading it out in a thin layer. By turning back once more, the cement, sand, and metal will, if the turning is correctly done, be well mixed together in a dry state.

The mixture should then be turned twice more while the water is sprinkled on through the rose of a watering can or hose. It is important to add only sufficient water to make a workable mixture. Too much water weakens the concrete; it tends to separate the cement and sand from the metal. When wheeling it in barrows the slurry rises to the top and the metal consolidates on the bottom. Immediately it is tipped, the slurry runs away to the lowest level, leaving a mass of impoverished metal. If the mix is too dry it is hard to spread and pack in position, particularly in moulds.

Well-mixed concrete is spongy, quakes like jelly, leaves the barrows and buckets freely, and is easily spread and worked into position. It does not require tamping; in fact it cannot be tamped or rammed, rather is it consolidated by spading. It tends to consolidate itself, and when cast in moulds will, with a minimum of spading, present a clean, even surface when the moulds are removed.

Placing in Position.—Immediately the concrete is mixed it should be placed in its final position. It is necessary to prepare for it by excavating, grading, levelling off, &c., or if it is to be placed in moulds these should be all ready to receive it. The ground should be well sprinkled with water just prior to placing the concrete. Moulds should be painted with a cheap grade of oil so that they will leave the concrete freely when taken down. Concrete will become quite useless if allowed to remain on the mixing board for hours.

It is often necessary to place new concrete or concrete that has set hard on top of the old, as for instance, when building a wall. The joining of new work to old is called bonding, and should be understood—particularly when constructing water tanks, silos, and the like, where a water-tight junction is necessary. It is better to leave the top fairly level and even to sweep it clean, and after flushing it at intervals with water to spread a layer over it ½-inch thick with mortar, consisting of one part of cement to two parts sand. This mortar will lie evenly on the old work and the stones of the new concrete will bed down into it. If the surface of the old work is left rough and only a coat of slurry spread over it, the stones or metal of the old and new work will meet without any matrix or mortar between to bind them together, and a weak and leaky junction is the result.

Curing.—In the process of setting or hardening, concrete uses up water, and its ultimate strength will be seriously impaired if this vital constituent is allowed to evaporate through exposure to a hot dry atmosphere induced by the sun, hot winds, or artificially by lighting of a fire in a furnace, oven, &c., before the concrete is quite hard. To counteract the action of the sun and hot winds, concrete floors and similar structures should be covered with bags or sand and kept wet for several days. Walls and the like, are, of course, protected by the moulds for some time, and it is not usual in ordinary structures to take special precautions with these except where severe frost is likely. Frost will interfere with the setting of concrete until it is at least forty-eight hours' old. It is therefore necessary to protect it with dry bags or iron, timber, and the like.

Rendering.—Rendering is the term applied to plastering or surfacing with cement mortar, i.e., sand and cement. For floors, the proportions are one part cement to two parts sand. For walls it may be one part cement to three parts sand, but will not then be waterproof; for water tanks, dips, &c., it should be one to two. Rendering is generally laid on from ⅜ to ½-inch thick. If required to be more than ½-inch thick it should be done in two-coat work, the first coat being scratched in criss-cross fashion to provide a key for the next coat.

Rendering must always be applied to well-moistened surfaces. For floors it should be put down a few hours after the concrete is laid, otherwise it will lift off the concrete, and be what is known as "drummy." If it is found necessary to render floors of concrete that is old or has dried hard, or even of brick, it is necessary to soak the surface with water for some hours and to brush over it a slurry of equal parts cement and sand immediately before applying the rendering.

Faith in the Farm Horse.

With just on forty years' experience as a breeder and user of horses, Mr. William Guskett, of Corowa, New South Wales, expresses the opinion that the horse has no equal for furnishing power for the farm. He cited the case of a neighbour who disposed of his horses and purchased a tractor, but towards the close of his first cropping season he was obliged to put it aside and get a team of horses together to finish his work. As an instance of the economy and long service of the horse, Mr. Guskett stated that he recently lost a mare by death, from which he had had twenty-one years' service, and he has another still going strong at the age of twenty-four. He wonders where a tractor would be at these ages. From the mare that died he had reared several foals, two of which he had sold for £50.

The Mating Age for Dairy Stock.

Old-time breeders never thought of allowing animals to breed until they had reached full maturity, and consequently they were never stunted in growth by reason of having to perform maternal duties before they had completed their growth, so that they developed bigger frames and produced stronger and better developed progeny.

Breeding from young stock is, of course, a great stimulant to early maturity, and by starting animals to breed young, there is not only a saving of time, but they become better mothers and more regular breeders.

The old custom was never to mate a heifer until she was from twenty-seven to thirty months' old, so that she would be three years' old when she gave birth to her first calf. By that time she had completed her growth, and had all the advantage of age and strength to perform her maternal duties.

Heifers that are put to breed at that early age would suffer no harm if they were allowed a rest between the first and second calf, but as a rule no rest is allowed, and they are kept on breeding as fast as they can, so that they never get any opportunity to make up for lost growth, and, besides, there is a big drain on the constitution.

TO FARMERS AND ORCHARDISTS.

"I should like to see every farmer and every orchardist take the 'Queensland Agricultural Journal.'"—Hon. Harry F. Walker, Minister of Agriculture and Stock, in the course of the debate on the Diseases in Plants Bill.

The Home and the Garden.

OUR BABIES.

Under this heading a series of short articles by the Medical and Nursing Staff of the Queensland Baby Clinics, dealing with the welfare and care of babies, has been planned in the hope of maintaining their health, increasing their happiness, and decreasing the number of avoidable cases of infant mortality.

CARE OF BABIES IN HOT WEATHER.

As the weather grows warmer babies need less clothing. In some parts of Queensland the weather is changeable at this season, and the baby's clothing should be regulated by the temperature, not by the calendar. Over-clothing causes sweating, and may lead to irritation and inflammation of the skin. Waterproof coverings over wet napkins are very likely to do this, and they should not be used. When it becomes really hot, the baby will be happier if he wears little or nothing besides a napkin and singlet with all his limbs free, but protected by mosquito-netting against flies and mosquitoes. He enjoys kicking his legs and waving his arms freely, and this is one of the advantages Queensland babies have.

In hot weather babies need rather less food but more water. Let them have water to drink between their feeds. A baby may be thirsty without being hungry, and if you try to satisfy his thirst with milk, which is a food. you may upset him. Be careful in increasing his diet at this season. If he is being fed on cow's milk this should be clean and fresh. As soon as possible after delivery put the milk in a small saucepan, which should be used for this purpose only, and bring it to the boiling point. Unless the milk has been properly pasteurised by a trustworthy process, this should always be done. Freshly boiled or pasteurised milk will keep quite fresh in an icebox for twenty-four hours, but without ice it cannot be expected to keep fresh for more than twelve hours. An icebox can be made of a kerosene tin placed in a box with 3 or 4 inches of dry sawdust all round, and covered by a lid.

Diarrhœa.

Babies who are being artificially fed very easily get diarrhœa in hot weather. It may be caused by overfeeding, by unsuitable food or by milk which is stale or dirty. If an artificially fed baby begins to have loose motions, all his food and all his milk should be stopped. He should be given one dose of castor oil to clear out any undigested food, and after that he should have nothing but thin barley water slightly sweetened for twenty-four hours. If then he is not quite well you should get medical advice or take him to the nearest Baby Clinic.

Gastro-Enteritis or Dysentery.

This is a serious disease which may begin gradually with loose motions, but sometimes comes on suddenly with fever and much weakness and irritability. The motions may be simply loose at first, but after a time they are seen to contain slime tinged with blood, may be very frequent and attended by much straining. Next month there will be many cases of this disease in Queensland, and some of these babies will die, for this has been so every year. If all our mothers understood how the disease is caused, and why it spreads from house to house, there would be much less dysentery and very few deaths from this cause among our babies.

Dysentery is not caused by the heat. Usually the worst of the epidemic is over before the hottest weather begins, though sometimes it continues right through the summer. Dysentery is not caused by feeding babies on cow's milk, for all disease germs in the milk are killed by boiling or pasteurising. But it is much more common among bottle-fed babies, whatever food they are getting, than among babies on the breast. The disease is caused by dysentery bacilli, and these disease germs are conveyed by flies from closet-pans or other filth to the babies' food. Not only must the food be most carefully protected from flies, but so must the bottles and teats after they have been scalded. Even breast-fed babies are not safe if they have dummies pinned on to their frocks to invite the disease-bearing flies to settle on them.

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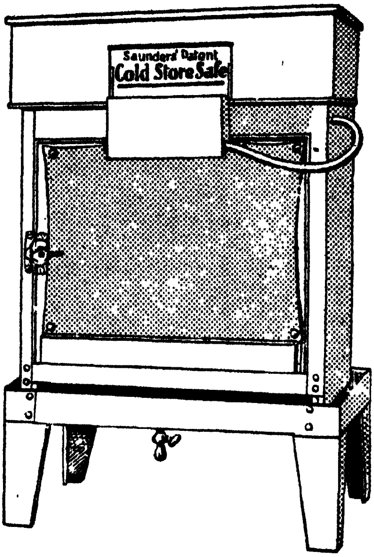

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Barley-water.

To make barley-water, take one tablespoonful of pearl barley, wash it carefully, add to 1 pint of water, and simmer for one hour. Then make up to 1 pint from the kettle, and strain carefully. Prepare fresh twice daily.

CONSTIPATION IN BABIES.

Breast-fed babies are never really constipated. Their motions are always soft, though they may be passed at long and irregular intervals. This sluggishness of the bowels arises from two causes—(1) Giving castor oil to the baby; (2) want of proper training.

Castor Oil Not Necessary for the Newborn Baby.

The first effect of castor oil is to empty the bowels. Its second effect is to prevent them from acting. The harmful and unnecessary practice of giving castor oil to a newborn baby starts an irregularity which is kept up and increased by repeated doses of castor oil. There results a condition artificially manufactured by the mother or nurse, which she calls "constipation."

Once or twice a day the baby should be allowed to lie without his clothes, or with only a singlet, and exercise his legs and abdominal muscles by freely kicking, for fifteen or twenty minutes in warm weather. This will often induce a motion. If necessary he must be held out over a pan, just touching its rim. It is a good plan to hold out a baby after each feed. He will pass water, thus keeping his napkin dry, and will often pass a motion. If the baby's training has been long neglected, these methods may not suffice. It may then be necessary to pass a soap pencil dipped in oil, or inject a few teaspoonfuls of plain boiled water into the bowel. Gently kneading the abdomen, beginning low on the right side, upwards to the ribs, across, and down on the left side, should help. Medicines should not be necessary.

Bottle-fed Babies.

Bottle-fed babies suffer from the same mismanagement and need the same treatment. With them the condition is more troublesome, for cow's milk is often constipating and causes firmer motions, often in solid masses, and sometimes in small round lumps like pebbles. The food may need adjusting, and it would be wise to consult a clinic nurse if possible. See that the baby drinks enough water. He may be taking more milk, especially if this is dried milk, than he should. The substitution of malt-sugar in the form of Mellin's Food, Maltogen, or Extract of Malt, for some or all of the sugar in his food, if often helpful. So is prune juice given as a medicine. If drugs are necessary, fluid magnesia, milk of magnesia, and liquid petroleum oil may be given in teaspoonful doses once or twice a day. No other medicines should be given except on medical advice.

A Very Important Point.

This is very important. Whatever medicines are given for constipation, much depends on the way the medicine is given. If too large a dose is given, or if it is given every second or third day, or once or twice a week, the irregularity of the bowels is increased, and the constipation may become permanent. The medicine should be given every day at the same time, in just sufficient doses to produce its effect and no more. The dose must be determined by trial. Once a daily regular action has been established, the dose should be slowly made less, and after a time may be left off. Used rightly, the medicine will help to cure constipation; used wrongly, the same medicine will make it worse.

THREADWORMS.

Children with threadworms generally suffer from an itchiness at the seat especially at bedtime. This may make them restless and prevent them from going to sleep. The itchiness is caused by the worms coming out of the anus and crawling about. More serious symptoms from threadworms are extremely rare in Queensland. "Picking at the nose" is not a sign of worms.

The only way to be sure that a child has threadworms is to see them in the motions. This is not difficult. They are about the size of cotton thread, about half an inch long, and are probably alive and wriggle. All sorts of things in the motions, for instance the stringy parts of bananas, are sometimes mistaken by mothers for worms. If you are in doubt, put the things into a small bottle with methylated spirits and show them to your doctor. Children should not be given medicines for worms that they have not got.

Causes.

Every threadworm grows from an egg which has been swallowed. These eggs are very small and can be seen only with a microscope. The young child swallows some of these eggs accidentally, perhaps from the fingers of another child. When the worms crawl out to lay their eggs and so cause itchiness, he crushes them with his fingers, which become covered with these invisible eggs. Even though the hands are washed clean, there remain many eggs under the finger nails. All young children put their fingers into their mouths at times, and so they are continually reinfecting themselves, and increasing the number of their worms. Older children who suffer from worms will be found nearly always to have the habit of biting their nails.

Treatment.

If the worms are numerous, medical treatment will give relief. Strong medicines are necessary, and as these may be dangerous, they should be given only under medical direction. Injections of strong salt and water (as much salt as the water will dissolve) given after the bowel has been emptied will often bring away many worms, and these injections are harmless. Though many worms may be brought away by medical treatment, there are nearly always a few left behind. From these the child will probably reinfect himself, and in a few months may have as many as before.

The real cure of threadworms depends on the mother. Make the child sleep in good thick "combinations," so that his fingers cannot get at the worms to crush them. Smear some vaseline around the anus before he goes to bed to prevent the worms crawling and causing itching, or ask your doctor for some ointment which will kill the worms when they come out. If reinfection is prevented, the few worms left will die out of themselves.

MARKET GARDENING.

PARSNIPS.

The culture of the parsnip is easy, and is precisely the same as that of the carrot. Depth of soil is of primary importance, and new seed should always be obtained. The seed may be sown in March or April for the main crop, in drills from 2 to 3 ft. apart, the plants being afterwards thinned out to 6 in. They should be ready for use in about six months after sowing.

PEANUTS.

The peanut prefers a rather light sandy loam which contains enough vegetable matter to make it light and porous to prevent the soil from becoming too dry.

Peanuts, however, can be grown over a fairly wide range of soils, provided they contain a sufficient quantity of lime.

The plant thrives under a great variety of climatic conditions, provided there is a season of at least five months free from frosts; but a greater percentage of oil is contained in the nut when grown under tropical or semi-tropical conditions.

Cultivation of the peanut is a comparatively simple matter. The seed-bed should be well worked to a depth of 5 in. Reduce to a fine tilth by means of harrow and roller in order to obtain a fine mulch.

The object of shallow cultivation will be apparent when it is explained that, after the embryo nuts are fertilised, the stalks to which they are attached will continue to push into the ground until a firm bed is reached for the nuts to mature on.

When the nuts are ripened near the surface of the soil harvesting operations will be facilitated, and the less number of nuts left in the ground.

Sowing may be carried out during spring and early summer. On large areas a corn-planter may be used, either single or double row, suitably-sized plates being chosen for the purpose, but it must be understood that only shelled nuts can be dealt with in this manner; where the shells are only broken, hand-planting must be resorted to.

The selection of suitable seed is most important, the nuts being carefully shelled and hand-picked, only plump and perfect ones with unbroken skins being used for sowing. Neglect in this direction will lead to blanks throughout the crop.

The rows should be 3 ft. apart, with about 15 in. between the nuts.

Cultivation should take place as early as possible, and every endeavour made to keep the ground loose and free from weeds until the flowering period, when all cultivation should cease owing to the likelihood of damage accruing to the plants. When the haulms have quite died down the nuts may be lifted. In America certain implements are used for lifting the nuts more or less successfully, but on friable soils the ordinary mouldboard plough may be used with advantage. Smaller areas are usually dealt with by the ordinary digging-fork.

When lifted, the nuts are allowed to lie in shallow windrows until dry enough to shake off all surplus soil adhering to them. Providing the weather is suitable, they can then be allowed to dry in the open, if some form of protection is given to them from dews; but it will be necessary to prevent their direct contact with the soil by laying down straw or other suitable material. When sufficiently dry they may be carted and stacked in a barn or shed that is protected from weather, and the nuts picked from the stems at the grower's convenience.

Varieties—Virginia Bunch; Red Tennessee; White Spanish.

PEAS.

This is an important and profitable market garden crop, deserving of more attention than is frequently given. Like broad beans, it is essentially a plant for temperate districts, but is readily grown in the cool months of the year in warmer localities.

The water requirements of the crop are considerable; therefore the preparation of the land should be commenced early enough to bring the soil into good working order, and to conserve the moisture. Both from a market gardener's and farmer's point of view, peas add to the fertility of the land, and may be followed by nearly any crop that he desires to grow.

Any stable, or other well-decayed farm manure may be used in preparing the soil. If the land is in good heart and has been manured for the preceding crop, this will not be necessary, providing a light dressing of phosphates or, if obtainable, potash be used.

In planting, some forms of maize drills can be adapted for sowing peas. For small areas, shallow drills can be opened and the seed dropped by hand, and then covered over by a light harrow, cultivator, or by hand hoe. Do not hesitate to get the horse to work between the rows; it may also be necessary to hand hoe the rows in order to eradicate the weeds that the cultivator does not touch.

The principal market varieties are—Yorkshire Hero, Dairy, Dwarf, Defiance, and Stratagem. As many stocks of so-called Yorkshire Hero peas contain a large proportion of stragglers, mostly a run-out, round, blue pea, it is essential that the grower gives a little care to the selection of his seed, which should be a hand-picked sample, and true to name. Those, who up to the present have only grown Yorkshire Hero are recommended to put in a small area of one or more of the other varieties named, all of which produce much larger pods, consequently they are easier to pick, fetch a better price, and are more uniform in appearance when cooked.

Peas lend themselves well to transport and marketing in bags.

POTATOES.

Require a deep and friable loam, rich in humus. Such soils are frequently met with along creek or river flats and among the many scrub acres of this State. Where river or creek flats, however, are nutgrass infected, root crops are difficult to cultivate and keep clean.

Under Southern Queensland conditions two crops of potatoes can be grown each year—*i.e.*, spring and autumn—plantings being made in the months of February, and from August to October, according to frost prevalence, although in certain coastal areas plantings can be successfully made of the spring crop during the latter part of July.

In the tropical North, in districts where this crop can be grown, planting takes place immediately after the wet season, the crop developing during the cool months.

The first cultivation for potatoes requires to be deep. Land intended for this crop should receive a thorough preparation several weeks before the planting season and be allowed to lie and sweeten, during which frequent cultivation should be given to ensure the destruction of weed-growths and to bring about a fine tilth of the soil.

Seed should be selected as free as possible from disease, of uniform medium size, preferably not larger than 2 in. in diameter.

All seed should be well sprouted or shot before planting. This can be effectively carried out by storing in shallow layers in a shed having an even temperature, and covering with straw or other suitable material.

As soon as the tubers show signs of sufficient growth (preferably not longer than one-eighth of an inch) they should be hardened off by exposure to the light, when less damage will accrue during subsequent handlings prior to and during planting.

As potatoes are highly susceptible to fungoid diseases it is advisable that the seed be treated with some form of fungicide prior to planting, and for this purpose commercial formalin forms one of the easiest and most effective methods. Take of commercial formalin 8 oz. and dilute in 15 gallons of water; immerse the tubers for two hours, drain, and when thoroughly dry, rebag, care being taken to see that all bags used have also been steeped in the solution. When dry, the tubers are fit for planting.

Seed, if not too large, may be planted whole and are to be preferred to cut tubers. If it is found necessary to cut the sets, lime (slaked) or ashes must be thoroughly dusted over the cut parts prior to planting.

Potatoes are planted in drills and are usually put in by means of a single-furrow mouldboard plough, the custom being to plant on every third round when taking a 9-in. furrow. This will give sufficient space between the drills for subsequent cultivation. Sets should be planted in the bottom of the furrow and at one side, at least 4 in. below the surface of the soil, with 12 in. to 15 in. between the sets.

As a preventive of blight a spraying of Bordeaux or Burgundy mixture should be given as soon as the leaves show above ground. A second spraying should be given just as the flowers are beginning to form.

Potatoes should not be lifted before the haulms have died down, unless intended for immediate use. Those intended for keeping should be allowed to thoroughly dry before bagging, and afterwards stored in loose, shallow layers in a somewhat dark but well-ventilated shed, care being taken to go over them occasionally in order to reject all bruised or rotten tubers.

Varieties recommended—Satisfaction, Brownell's Beauty, Carmen No. 1, Up to Date, Scottish Triumph.

PUMPKINS, MARROWS, SQUASHES, AND MELONS.

All members of this family require a rich soil, although pumpkins give fairly good results on comparatively poorer soils than those suited to marrows or melons. The soil should be deeply worked and care taken to add liberal dressings (where required) of manure.

Pumpkins are frequently grown between rows of maize, but where planted by themselves, for cattle use, may be dealt with in drills spaced from 12 to 15 ft. apart and spaced 12 ft. in the rows. The great secret in obtaining success in this crop is to keep the plants moving from the time they show above ground, and frequent cultivation will conserve the moisture, and at the same time check all weed-growths.

Increased returns can be obtained by judicious shortening of the lateral and main vines, which induces the plant to "fruit" and to form thick foliage over the roots, thus enabling it to resist to a greater extent hot and dry conditions.

Marrows and squashes are grown under similar conditions to those of pumpkins, with this exception, the distance between and in the rows being much reduced.

Melons.—Rockmelons like a fairly stiff loam—not the stiffest of soil, but one which responds well to cultivation. The cultivation for rockmelons is similar to that of the cucumber.

Water-melons.—For the production of this crop, on a commercial scale, a warm climate and an assured supply of moisture are essential for market purposes; therefore the crop is practically limited to the coast or to areas which can be watered; however in the inland districts good crops are obtainable when seasons are favourable.

Preserving melons.—From a market gardener's standpoint of profit, these melons are not comparable with watermelons, but a good demand exists for firm-fleshed preserving melons for jam making. The round-shaped, red-seeded kinds are usually more in favour than the green-seeded varieties.

The cultivation of the melon is similar to that of the pumpkin, but distances between and in the rows may be considerably reduced.

VARIETIES.

Pumpkins, for cattle feed.—Selected Cattle Pumpkins.

Table Pumpkins.—Ironbark, Crown, Triamble, Button, Turk's Cap, Bugle Pumpkins, and Grammas; for general use.

Marrows.—White Bush, White Trailing, and Custard Marrow.

Rockmelons.—Nutmeg, Burpee's Champion Market, and Rocky Ford.

Water-melons.—Cuban Queen, Kleckley Sweets, McIvor Sugar, Sugarstick, Halbert's Honey, and Kolb's Gem.

Seeds may be sown in early spring, as soon as all danger from frost is over.

KITCHEN GARDEN.

A first sowing of cabbages, cauliflower, and Brussels sprouts may now be made in covered seed beds, which must be well watered and carefully protected from insect pests. Sow in narrow shallow drills; they will thus grow more sturdy, and will be easier to transplant than if they were sown broadcast. The main points to be attended to in this early sowing are shading and watering. Give the beds a good soaking every evening. Mulching and a slight dressing of salt will be found of great benefit. Mulch may consist of stable litter, straw, grass, or dead leaves. Dig over all unoccupied land, and turn under all green refuse, as this forms a valuable manure. Turn over the heavy land, breaking the lumps roughly to improve the texture of the soil by exposure to the sun, wind, and rain. In favourable weather, sow French beans, cress, cauliflower, mustard, cabbage, celery, radish for autumn and winter use. Sow celery in shallow well-drained boxes or in small beds, which must be shaded till the plants are well up. Parsley may be sown in the same manner. Turnips, carrots, peas, and endive may also be sown, as well as a few cucumber and melon seeds for a late crop. The latter are, however, unlikely to succeed except in very favourable situations. Transplant any cabbages or cauliflowers which may be ready. We do not, however, advise such early planting of these vegetables, because the fly is most troublesome in February. For preference, we should defer sowing until March. Still, as "the early bird catches the worm," it is advisable to try and be first in the field with all vegetables, as prices then rule high. Cucumbers, melons, and marrows will be in full bearing, and all fruit as it ripens should be gathered, whether wanted or not, as the productiveness of the vines is decreased by the ripe fruit being left on them. Gather herbs for drying; also garlic, onions, and eschalots as the tops die down.

FLOWER GARDEN.

To make the flower-beds gay and attractive during the autumn and winter months is not a matter of great difficulty. Prepare a few shallow boxes. Make a compost, a great part of which should consist of rotten leaves. Fill the boxes with the compost; then sow thinly the seeds of annuals. Keep the surface of the soil moist, and when the young seedlings are large enough to handle, lift them gently one by one with a knife or a zinc label—*never pull them up by hand*, as, by so doing, the tender rootlets are broken, and little soil will adhere to the roots. Then prick them out into beds or boxes of very light soil containing plenty of leaf mould. Keep a sharp lookout for slugs and caterpillars.

All kinds of shrubby plants may be propagated by cuttings. Thus, pelargoniums, crotons, coleus, and many kinds of tropical foliage plants can be obtained from cuttings made this month. After putting out cuttings in a propagating frame, shade them with a piece of calico stretched over it. Be careful not to over-water at this season. Propagate verbenas, not forgetting to include the large scarlet fox hunter. Verbenas require rich soil. Palms may be planted out this month. If the weather prove dry, shade all trees planted out. With seed-boxes, mulch, shade, water, and kerosene spray, all of which imply a certain amount of morning and evening work, the flower garden in autumn and winter will present a charming sight.

Orchard Notes for January.

THE COASTAL DISTRICTS.

All orchards, plantations, and vineyards should be kept well cultivated and free from weed growth; in the first place, to conserve the moisture in the soil, so necessary for the proper development of all fruit trees and vines; and, secondly, to have any weed growth well in hand before the regular wet season commences. This advice is especially applicable to citrus orchards, which frequently suffer from lack of moisture at this period of the year if the weather is at all dry, and the young crop of fruit on the trees is injured to a greater or less extent in consequence.

Pineapple plantations must also be kept well worked and free from weeds, as when the harvesting of the main summer crop takes place later on, there is little time to devote to cultivation. If this important work has been neglected, not only does the actual crop of fruit on the plants suffer, but the plants themselves receive a setback.

Banana plantations should be kept well worked, and where the soil is likely to wash badly, or there is a deficiency of humus, a green crop for manuring may be planted. Should the normal wet season set in, it will then soon cover the ground without injury to the banana plants. When necessary, banana plantations should be manured now, using a complete manure rich in potash and nitrogen. Pineapples may also be manured, using a composition rich in potash and nitrogen, but containing no acid phosphate (superphosphate) and only a small percentage of bonemeal, ground phosphatic rock, or other material containing phosphoric acid in a slowly available form.

Bananas and pineapples may still be planted, though it is somewhat late for the former in the more southern parts of the State. Keep a good lookout for pests of all kinds, such as Maori on citrus trees, scale insects of all kinds, all leaf-eating insects, borers, and fungus pests generally, using the remedies recommended in Departmental publications.

Fruit fly should receive special attention, and on no account should infested fruit of any kind be allowed to lie about on the ground to become the means of breeding this serious pest. If this is neglected, when the main mango crop in the South and the early ripening citrus fruits are ready, there will be an army of flies waiting to destroy them.

Be very careful in handling and marketing of all kinds of fruit, as it soon spoils in hot weather, even when given the most careful treatment. Further, as during January there is generally more or less of a glut of fresh fruit, only the best will meet with a ready sale at a satisfactory price.

Grapes are in full season, and in order that they may be sold to advantage they must be very carefully handled, graded, and packed, as their value depends very much on the condition in which they reach the market and open up for sale. Well-coloured fruit, with the bloom on and without a blemish, always sells well, whereas badly coloured, immature, or bruised fruit is hard to quit.

One of the greatest mistakes in marketing grapes is to send the fruit to market before it is properly ripe, and there is no better way to spoil its sale than to try and force it on the general public when it is sour and unfit to eat.

Bananas for sending to the Southern States require to be cut on the green side, but not when they are so immature as to be only partially filled. The fruit must be well filled but show no sign of ripening; it must be carefully graded and packed and the cases marked in accordance with the regulations under the Fruit Cases Acts and forwarded to its destination with as little delay as possible.

Pineapples should be packed when they are fully developed, which means that they contain sufficient sugar to enable the fruit to mature properly. Immature fruit must not be marketed, and if an attempt is made to do so the fruit is liable to seizure and the sender of the fruit to prosecution under the abovenamed regulations. Further, the fruit must be graded to size and the number of fruit contained in a case must be marked thereon. Immature fruit must not be sent. For canning, the fruit should be partly coloured; immature fruit is useless; and overripe fruit is just as bad. The former is deficient in colour and flavour and the latter is "winey" and of poor texture, so that it will not stand the necessary preparation and cooking.

Should there be a glut of bananas, growers are advised to try and convert any thoroughly ripe fruit into banana figs.

The fruit must be thoroughly ripe, so that it will peel easily, and it should be laid in a single layer on wooden trays and placed in the sun to dry. If the weather is settled, there is little trouble, but if there is any sign of rain the trays must be stacked till the weather is again fine, and the top of the stack protected from the rain. To facilitate drying, the fruit may be cut in half lengthways. It should be dried till a small portion rubbed between the finger and thumb shows no sign of moisture. It can be placed in a suitable box to sweat for a few days, after which it can be dipped in boiling water to destroy any moth or insect eggs that may have been laid on it during the process of drying and sweating. It is then placed in the sun to dry off any moisture, and when quite dry it should be at once packed into boxes lined with clean white paper. It must be firmly packed, when, if it has been properly dried, it will keep a considerable time. It can be used in many ways, and forms an excellent substitute for raisins, sultanas, currants, or other dried fruits used in making fruit cakes and other comestibles. Banana figs will be found useful for home consumption, and it is possible that a trade may be built up that will absorb a quantity of fruit that would otherwise go to waste.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

January is a busy month in the Granite Belt, and orchardists are fully occupied gathering, packing, and marketing the crop of midseason fruits, consisting of plums of several kinds, peaches, nectarines, pears, and apples. The majority of these fruits are better keepers and carriers than those that ripen earlier in the season; at the same time, the period of usefulness of any particular fruit is very limited, and it must be marketed and disposed of with as little delay as possible.

With the great increase in production, owing to the large area of new orchards coming into bearing and the increasing yields of those orchards that have not come into full profit, there is not likely to be any market for immature or inferior fruit. There will be ample good fruit to fully supply the markets that are available and accessible. Much of the fruit will not carry far beyond the metropolitan market, but firm-fleshed plums, clingstone peaches, and good firm apples should stand the journey to the Central District, and, if they are very carefully selected, handled in a manner to prevent any bruising, and properly graded and packed, they should carry as far as Townsville. Growers must remember that, given a market fully supplied with fruit, only such fruit as reaches that market in first-class condition is likely to bring a price that will pay them; consequently the grower who takes the trouble to send nothing but perfect fruit, to grade it for size and colour, to pack it carefully and honestly, placing only one sized fruit, of even quality and even colour, in a case and packing it so that it will carry without bruising, and, when opened up for sale, will show to the best advantage, is pretty certain of making good. On the other hand, the careless grower who sends inferior, badly graded, or badly packed fruit is very likely to find when the returns for the sale of this fruit are to hand, that after paying expenses there is little, if anything, left. The expense of marketing the fruit is practically the same in both cases.

Then why spoil the ship for a ha'p'orth of tar after you have gone to the expense of pruning, spraying, manuring, and cultivating your orchard? Why not try and get a maximum return for your labour by marketing your fruit properly? The packing of all kinds of fruit is a fairly simple matter, provided you will remember—

(1) That the fruit must be fully developed, but yet quite firm when gathered.

(2) That it must be handled like eggs, as a bruised fruit is a spoilt fruit, and, when packed with sound fruit, spoils them also.

(3) That only one-sized fruit, of an even degree of ripeness and colour, must be packed in a case.

(4) That the fruit must be so packed that it will not shift, for if it is loosely packed it will be so bruised when it reaches its destination that it will be of little value. At the same time, it must not be packed so tightly as to crush the fruit.

If these simple rules are borne in mind, growers will find that much of the blame they frequently attribute to the fruit merchants or middlemen is actually the result of their own lack of care. Fruit that opens up in the pink of condition sells itself, whereas any fruit that opens up indifferently is hard to sell on any except a bare market, and on a glutted market is either unsaleable or realises such a poor price that the grower is frequently out of pocket and would have been better off had he not attempted to market it.

If spraying with arsenate of lead, and systematic bandaging, has been properly carried out, there will be comparatively few codlin moths to destroy the later ripening pip fruits; but if these essential operations have been neglected or carelessly carried out a number of moths will hatch out and the eggs laid by them will turn to larvæ that will do much damage, in some cases even more than that caused by the first broods that attack the fruit as soon as it is formed. Where there is any likelihood, therefore, of a late crop of moths, spraying with arsenate of lead must be continued if the late crop of pip fruits is to be kept free from this serious pest.

Fruit fly must be systematically fought, and on no account must any fly-infected fruit be allowed to lie about on the ground and breed this pest, to do further damage to the later ripening fruits.

Citrus orchards will need to be kept well cultivated in the drier and warmer parts of the State, and, where necessary, the trees should be irrigated. If scale insects are present, the trees should be either sprayed, or, better still, treated with hydrocyanic acid gas.

Western grapes are in full season, and if they are to be sent long distances by rail then they are all the better to be cut some hours before they are packed, as this tends to wilt the stems and keep the berries from falling off in transit. The fruit must be perfectly dry when packed, and should be as cool as possible. It must be firmly packed, as a slack-packed case always carries badly and the fruit opens up in a more or less bruised condition.

Farm Notes for January.

FIELD.—The main business of the field during this month will be ploughing and preparing the land for the potato and other future crops, and keeping all growing crops clean. Great care must be exercised in the selection of seed potatoes to ensure their not being affected by the Irish blight. Never allow weeds to seed. This may be unavoidable in the event of long-continued heavy rains, but every effort should be made to prevent the weeds coming to maturity. A little maize may still be sown for a late crop. Sow sorghum, imphee, Cape barley, vetches, panicum, teosinte, rye, and cowpeas. In some very early localities potatoes may be sown, but there is considerable risk in sowing during this month, and it may be looked upon merely as an experiment. Plant potatoes whole. Early-sown cotton will be in bloom.

On coastal and intercoastal scrub districts, where recently burnt-off scrub lands are ready for the reception of seed of summer-growing grasses, sowing may commence as soon as suitable weather is experienced. Much disappointment may be saved, and subsequent expenditure obviated, by ensuring that only good germinable grass seed is sown, of kinds and in quantities to suit local conditions, the circumstance being kept in mind that a good stand of grass is the principal factor in keeping down weeds and undergrowth.

In all districts where wheat, barley, oats, canary seed, and similar crops have recently been harvested, the practice of breaking up the surface soil on the cropped areas should invariably be adopted. Soil put into fit condition in this way will "trap" moisture and admit of the rains percolating into the subsoil, where the moisture necessary for the production of a succeeding crop can be held, provided attention is given to the maintenance of a surface mulch, and to the removal, by regular cultivation, of volunteer growths of all kinds. If not already seen to, all harvesting machinery should be put under cover, overhauled, and the woodwork painted where required.

Where maize and all summer-growing "hoed" crops are not too far advanced for the purpose, they should be kept in a well-cultivated condition with the horse hoe. Young maize and sorghum crops will derive much benefit by harrowing them, in the same direction as the rows are running, using light lever harrows with the tines set back at an angle to obviate dragging out of plants, but the work should not be done in the heat of the day.

Quick-maturing varieties of maize and sorghum may still be sown in the early part of the month in coastal areas where early frosts are not expected.

Succession sowings may be made of a number of quick-growing summer fodder crops—Sudan grass, Japanese and French millet, white panicum, and liberty millet (panicum). In favourable situations, both "grain" and "saccharine" sorghums may still be sown; also maize, for fodder purposes.

Fodder conservation should be the aim of everyone who derives a living from stock, particularly the dairyman; the present is an important period to plan cropping arrangements. Exclusive of the main crops for feeding-off (when fodder is suitable for this purpose), ample provision should be made for ensilage crops to be conserved in silo or stack. As natural and summer-growing artificial grasses may be expected to lose some of their succulence in autumn, and more of it in winter and early spring, the cropping "lay-out" to provide a continuity of succulent green fodder throughout the season calls for thorough and deep cultivation and the building up of the fertility and moisture-holding capacity of the soil. Planter's friend (sorghum) may be sown as a broadcast crop at the latter end of the month for cutting and feeding to cattle in the autumn and early winter. Strips of land should be prepared also for a succession sowing about the second week in February, and for winter-growing fodder crops.

CONTROL OF WEEDS—SOME USEFUL MEASURES.

Once some species of weeds become firmly established, eradication is practically impossible; effective control of these is only possible before they have become established. Where weeds have taken possession and landowners realise that cutting is impossible, they look with hope to the use of chemicals as a means of destruction; but the question of cost must be considered, and although chemicals have been found to be effective in destroying weeds, on the whole the cost in such cases is prohibitive.

The old method of destroying plants by hand-hoeing or cultivation still remains as practically the only effective one that can be adopted. Provided the weeds are attacked in time and every care is exercised in cutting out new plants as they appear, weeds can be kept in control by this means at a comparatively low cost. Nevertheless, from various causes, weeds may eventually become so firmly established that other methods must be adopted, and the following suggestions are made so that farmers and graziers may adapt them to their needs in accordance with the severity of the infestation and the means at their disposal.

Destruction by Cultivation.—Certain weeds that are crop pests have roots or underground stems of such a nature that the plant reproduces freely from them, and, as a consequence, these weeds (amongst them are Johnson grass, sorrel, bindweed, &c.) are difficult to control. The most effective means of controlling weeds of this type is to plough the land deeply about September, and to cultivate it in such a way that the soil moisture is dried out. This can usually be done by cultivating the land very deeply with springtooth or rigid tine cultivators.

The object should be to loosen the land as much as possible, and at the same time to bring the roots to the surface. Provided the weather remains dry, this method is fairly effective, and if the weed is not killed entirely it is thinned out to a considerable extent. Obviously, however, the method is only successful when the weather is fairly dry, and it does not give good results in districts with a heavy rainfall.

Smothering Crops.—In conjunction with the cultivation method, smothering crops can be used with excellent results. After cultivating the land thoroughly in the way suggested, a rapid-growing crop such as wheat or oats should be sown. The cultivation of the land puts it in good condition for the crop, and the rapid growth under fairly favourable conditions prevents weed growth and establishes control.

Enforced Germination.—Another method of bringing weeds under control by cultivation is to work the land in such a way that the most favourable conditions are created for the germination of seed, and then to destroy the seedlings. Every farmer knows that when crop seed is being sown the soil must be put into a favourable condition for germination, and if the object is to destroy weeds, similar conditions must prevail.

The time and method of cultivating the soil will depend on the habits of the weed. If the weed is one which grows in the spring the soil workings must be made with the object of having the soil in proper condition at that period, while on the other hand if they are winter-growing seeds the soil must be prepared for favourable germination during the autumn.

Generally the practice should be to plough the land at least a month or two before the period when germination is expected, to allow weathering, and then to work with cultivators and harrows to reduce the soil to a fine tilth. In some cases, especially if the soil is in a loose condition, it may be advisable to use a roller in order to make it firm, as germination always occurs more satisfactorily when the seed is in a firm soil with from 1 inch to 2 inches of loose, fine soil on the surface. The young seedlings are then destroyed by the subsequent cultivations given to preserve the mulch and to prepare the seed-bed for the crop.

For weeds such as saffron thistle, star thistle, and others of a similar character which infest the wheat-growing areas, this is the most effective method. but to control these and other weeds which affect the wheat crop it is necessary to adopt a system of long fallow and to have the land under cultivated fallow for about twelve months—A. and P. Notes, New South Wales Department of Agriculture.

ASTRONOMICAL DATA FOR QUEENSLAND.

Times Computed by D. EGLINTON, F.R.A.S., and A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

	December, 1929.		January, 1930.		MOONRISE Dec., 1929.	MOONRISE Jan., 1930.
Date.	Rises.	Sets.	Rises.	Sets.	Rises	Rises.
1	4.50	6 32	5 2	6.48	a.m. 4.24	a.m. 5 35
2	4 50	6 32	5 2	6 48	5 9	6 28
3	4.50	6.33	5 3	6 48	5.57	7 23
4	4 50	6.34	5 4	6 49	6 48	8 19
5	4 50	6 35	5 4	6.49	7.42	9.14
6	4 50	6 35	5 5	6 49	8.37	10.9
7	4.50	6.36	5 6	6.50	9.31	11 2
8	4 51	6 37	5.7	6.50	10 26	11 57
9	4 51	6.37	5.8	6 50	11.20	p.m. 12 55
10	4 52	6 38	5 9	6 50	p.m. 12 16	1 56
11	4 52	6.38	5.10	6 50	1 11	3.2
12	4 53	6 39	5 11	6 50	2.9	4 11
13	4.53	6 39	5 12	6 50	3.10	5 19
14	4 54	6 40	5 13	6.50	4 17	6 27
15	4.54	6.40	5 14	6.50	5.27	7 29
16	4.55	6.41	5 15	6 49	6.36	8.22
17	4 55	6.41	5 15	6 49	7.46	9 5
18	4.55	6.42	5 16	6 49	8.50	9 41
19	4.56	6.43	5 17	6.48	9.47	10.14
20	4.56	6.44	5.18	6.48	10.30	10.46
21	4.56	6.44	5.19	6.48	11.9	11.18
22	4 57	6.45	5 20	6 47	11.43	11.50
23	4 57	6.45	5.21	6 47		...
24	4.58	6.46	5.21	6.47	a.m. 12.16	a.m. 12.26
25	4.58	6.46	5.22	6.46	12.46	1.5
26	4 59	6.46	5 23	6.46	1.18	1 50
27	4 59	6.47	5.24	6 46	1.51	2.39
28	5 0	6.47	5.24	6.46	2.27	3.31
29	5.0	6.47	5 25	6.45	3.6	4.24
30	5.1	6.48	5.25	6.45	3.52	5.19
31	5.2	6.48	5.26	6.45	4.43	6.14

Phases of the Moon, Occultations, &c.

1 Dec.	●	New Moon	2 48 p.m.
8 „	☾	First Quarter	7 42 p.m
16 „	○	Full Moon	9 38 p.m.
23 „	☽	Last Quarter	12 27 p.m.
31 „	●	New Moon	9 42 a.m.

Apogee, 5th December, at 3.24 p.m.
Perigee, 17th December, at 10.6 p.m.

During the evening of the 15th it will be interesting to notice the Moon approaching nearer and nearer to Jupiter until midnight when Jupiter will be only 3 degrees above it, and both being near the meridian, will be rather more than half-way from the zenith, at Brisbane and Warwick, to the northern horizon. The Moon being nearly full, Jupiter will lose a great deal of its brightness, and for two or three evenings its satellites cannot be observed to advantage.

On the 22nd the Sun will reach the Tropic of Capricorn, rising and setting nearly 23½ degrees south of the points due east and due west. It will be found useful to have these points carefully noted on the eastern or western horizon.

On Christmas Day Saturn will be on the farthest side of its orbit, about 886 million miles beyond the Sun, which will then be passing from west to east between the two planets, but very much nearer to the earth. As the Sun sets on that day the magnificent constellation Orion will be rising.

Later on the whole of Orion, with the two finest fixed stars, Sirius and Canopus, stretching round to the right of it, and the Pleiades and Hyades with the great planet Jupiter on the left will, in the absence of the Moon and clouds, present a most beautiful picture of the starry heavens.

* * *

8 Jan.	☾	First Quarter	1 11 p.m.
15 „	○	Full Moon	8 21 a.m.
22 „	☽	Last Quarter	2 7 a.m.
30 „	●	New Moon	5 7 a.m.

Apogee, 2nd January, at 1·48 a.m.
Perigee, 15th January, at 10·24 a.m.
Apogee, 29th January, at 2·12 a.m.

On the 3rd the earth will make her nearest approach to the Sun from which its distance will be 91,300,000 miles.

The planets Venus, Mars, and Saturn will be apparently close to one another on the morning of the 3rd, but as they will rise only about one half-hour before the Sun they will be lost in the coming daylight.

On the 6th Mercury will be at its greatest distance, 19 degrees on the east side of the Sun.

The occultation of Iota Geminorum by the Moon, on the 14th instant, which will take place about 11 p.m., will not be visible north of Mackay, where the star will appear very near the northern edge of the Moon. Through binoculars or telescope it will be interesting to watch the star apparently skirting the northern limb of the full Moon. In the southern half of Queensland the star will disappear behind the Moon sooner further south and its reappearance will be proportionately retarded.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter [illegible] not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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